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BUREAU OF PUBLIC ADMINISTRATION
DEPARTMENT OF POLITICAL SCIENCE

TWENTY-FIRST BIENNIAL REPORT

OF THE

BOARD OF FISH AND GAME COMMISSIONERS

OF THE

STATE OF CALIFORNIA

FOR THE YEARS 1909-1910

COMMISSIONERS:

1909.	
GEORGE STONE	SAN FRANCISCO
F. W. VAN SICKLEN	ALAMEDA
M. J. CONNELL	LOS ANGELES
1910.	
F. W. VAN SICKLEN	ALAMEDA
M. J. CONNELL	LOS ANGELES
W. G. HENSHAW	OAKLAND

SACRAMENTO:
W. W. SHANNON, : : : : SUPERINTENDENT STATE PRINTING.
1910

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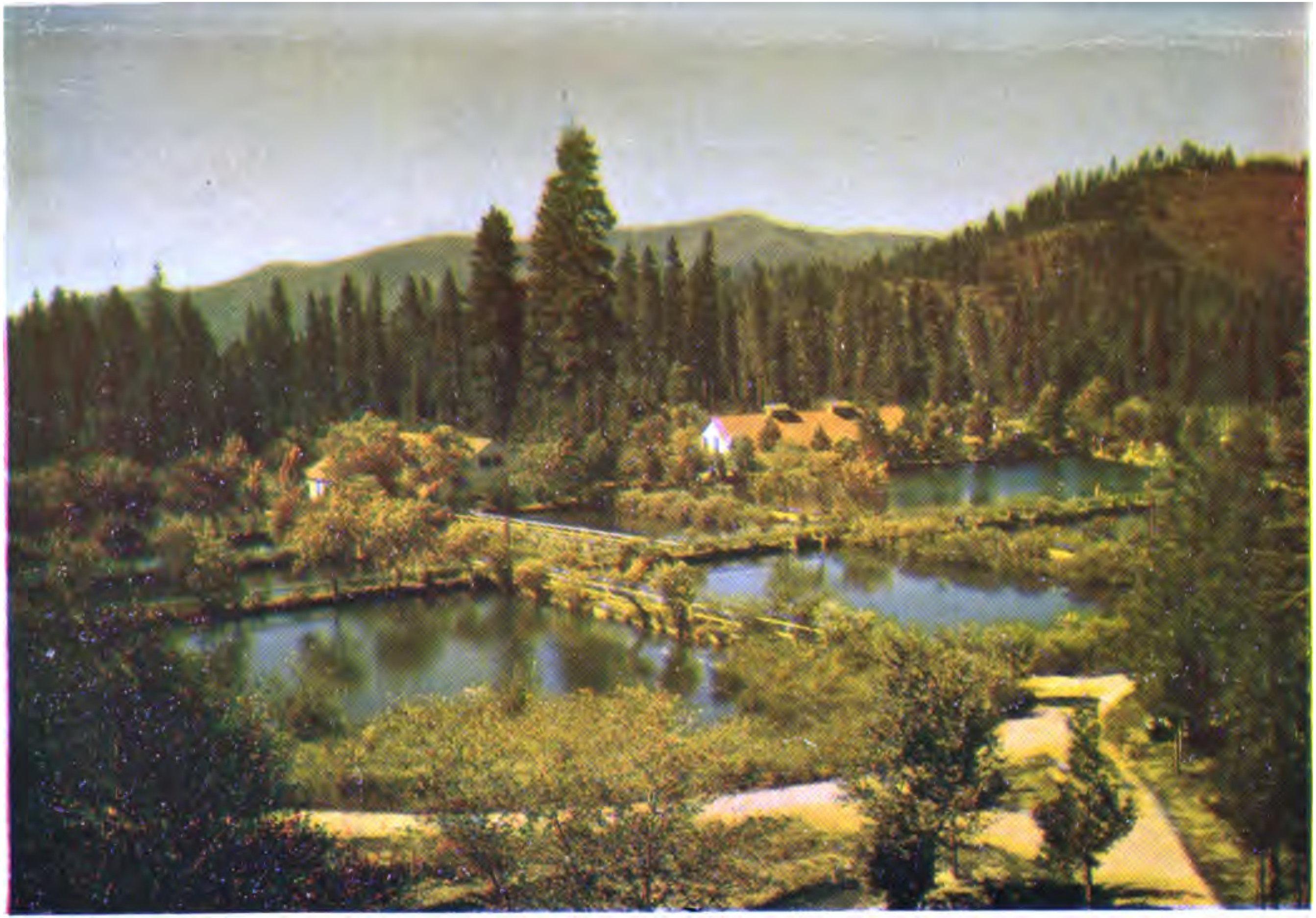


PARTIAL VIEW TROUT REARING PONDS, SISSON HATCHERY

TRICHROMATIC PHOTOGRAPH DIRECT FROM NATURE, JUNE 1910

TWENTY-FIRST BIENNIAL REPORT

OF THE

BOARD OF FISH AND GAME COMMISSIONERS.

SAN FRANCISCO, CAL., November 11, 1910.

HON. J. N. GILLETT,
Governor, State of California, Sacramento, Cal.

SIR: In accordance with law, the Board of Fish and Game Commissioners have the honor to submit for your consideration its Twenty-first Biennial Report, showing the receipts and expenditures from July 1, 1908, to June 30, 1910; also a record of its work from the date of its last report, September 1, 1908, to September 1, 1910.

Owing to the exhaustion of the appropriation given the Commission for printing at the thirty-seventh session of the legislature, the Board was unable to print for general distribution its twentieth biennial report. You will find in the Appendix of this report a reprint of that report as submitted to you and the members of the thirty-eighth session, that it may in this way take its place in the history of the Commission.

During the thirty-eighth legislative session we succeeded in having the statutes so amended that after July 1, 1909, ample authorization could be found permitting us to pay for all necessary printing and stationery supplies out of our own funds without taxing the general fund of the State therefor, and we are, therefore, able this year to present a more elaborate and detailed report.

We also submit for your consideration such recommendations as in our judgment the legislature should, for the betterment of existing conditions, provide enactments.

The personnel of the Commission since its biennial report of 1906 has undergone several changes. On May 14, 1907, Mr. George Stone of San Francisco, who had been appointed by you to fill the vacancy caused by the resignation of Mr. W. W. Van Arsdale, presented his credentials and took office. On June 25, 1907, Mr. F. W. Van Sicklen of Alameda succeeded to the vacancy caused by the resignation of Mr. W. E. Gerber, who, with Commissioner Van Arsdale, had served nearly six years. At the first meeting of the Board held May, 1907, George Stone was elected president, and served until May 12, 1910. On July 15, 1908, Mr. M. J. Connell of Los Angeles, who had been appointed by you, presented his credentials to the Board, succeeding Mr. John Bermingham, Jr., of Pinole (resigned), who had served from March 23, 1905. On May 12, 1910, Mr. W. G. Henshaw of Oakland, who had been appointed by you to fill the vacancy caused by the resignation of George Stone, took his seat as a member of the Board. On August 15, 1910, Mr. Chas. A. Vogelsang, who had been the Chief Deputy of the Board since October 15, 1901, and who on May 12, 1910, tendered his resignation as such officer, was succeeded on August 15, 1910, by John P. Babcock, who was the Chief Deputy of the Board from 1892 to 1901.

In order to better meet the demands made by the steadily increasing volume of business, it was decided to establish a southern district, with headquarters at Los Angeles, and that office to be under the personal supervision of the resident commissioner, Mr. M. J. Connell, to whom all deputies in southern California should report. This office was established July 1, 1908, and embraces the counties of San Diego, Imperial, Riverside, Orange, San Bernardino, Los Angeles, Inyo, Ventura, Santa Barbara, and San Luis Obispo.

The results proving so satisfactory, another district was established June 1, 1909, in the San Joaquin Valley, with headquarters at Fresno, and Deputy A. D. Ferguson placed in charge. The San Joaquin district embraces the counties of Kern, Kings, Tulare, Fresno, Mariposa, Merced, Madera, Stanislaus, and Tuolumne.

This segregation of the work has greatly facilitated the dispatch of business and proved of great advantage to the respective sections, and strongly suggests the advisability of establishing a third district in the northern part of the State.

The results that have followed amendments to the statutes during the thirty-seventh and thirty-eighth legislative sessions, and which became laws by your approval, have been in the main satisfactory.

The commercial fisherman's license law, as amended at thirty-eighth session produced a total revenue for the first year of its operation of $22,350.00, as against a maximum collection under the old law of $6,647.50, or an annual gain of more than $15,000.00. Under the provisions of this law a fee is exacted of every person who fishes for profit, whether using boat, nets, crawfish traps, or lines of any kind. This feature has enabled us to collect from many who were practically exempt under the old law, which applied only to those who used boats and nets. The total amount arising from this source is added to the appropriation of $20,000.00, made for the support and maintenance of hatcheries. It has enabled us to carry out necessary improvements at our Eel River and Sisson hatcheries, and to acquire two entirely new and modern patrol boats. without a cent of appropriation therefor.

Without this source of revenue it would be an absolute necessity, in order to keep up the standard of our hatcheries and maintain an efficient patrol over the commercial fisheries, to ask for a larger appropriation from the general fund of the State.

Should any change be deemed necessary in the present license law, it should in our opinion lie in the direction of a still higher fee from the alien who comes to our State to improve his condition, and in the majority of cases gives but little or nothing in return for the benefits he receives. It is well understood that an individual who engages in farming must first acquire land, for which he pays a fixed price, either in original cost or rental, in addition to which he must pay for the tools and seed to plant it; but the fisherman gets thousands of acres of water, rent free, and the State pays for the seeding of it; his only outlay is for the tools he works with, therefore he can well afford to pay a liberal license fee, which goes for the maintenance and betterment of the very industry out of which he earns a livelihood.

We are pleased to report the continued success of the hunting license law, now in its fourth year—the popularity of which is best shown by the returns. Our State took second place in the Union in its first year, being exceeded only by the State of Illinois, which has a population of 5,000,000, as against 2,000,000 for California. The total value of sales in Illinois was approximately $150,000.00; in California $118,000.00. There was a falling off in sales for the second year of about $3,500.00, due to the use of a metal tag for a license, which bore no identification other than a number, and rendered loaning and trading comparatively easy and detection of the offense very difficult. For the third year, ending June 30, 1910, the record shows a gain of $14,000.00 over the preceding year, or a grand total of $128,452.00. While some complaint has been heard regarding the use of a paper license, we feel the returns have fully justified the change. All states that have used a metal license have abandoned it in favor of a paper or cloth license, on which can be inscribed the purchaser's name, with his description and signature.

A recommendation, which had the universal endorsement of the sportsmen of the State, that a combined hunting and angling license be adopted, good for either hunting, or angling, for game fish, or both, we regret to say failed of final passage in the assembly. One most important point was gained, however, in making the law apply to the hunting of any wild birds and animals, as distinguished from *protected* birds and animals. This law removes all excuse for being out in the field without a license under the pretext of shooting unprotected game—a loophole that was quickly taken advantage of by most of the aliens, who would not take out a $25.00 license. It resulted in the sale of more alien licenses, but its best effect was shown in keeping them out of the field, where their indiscriminate slaughter of all kinds of song birds, as well as game birds and animals, is well understood.

The reduction in bag limits on quail, dove, snipe, curlew, ibis, plover, rail, and other shore birds from 25 to 20, and on wild ducks from 35 to 25, has met with the universal approval of all genuine sportsmen, the only exception being a complaint from some market dealers and hotels against the reduction in the bag limit on ducks. This complaint will continue so long as ducks may be bought and sold.

The two years close season on mountain quail and corresponding extension of the close season on grouse and sage hens was wise and timely. Both birds are showing a decided increase, and when the present restrictions expire September 1, 1911, and provision is made for bag limit and season, we believe that by a careful enforcement and observance of the law the supply will never be perceptibly diminished.

Our recommendation with regard to making it an offense to use any trained animal, except a dog, as a blind or means of approach for the purpose of killing wild ducks or other waterfowl became a law, and has materially benefited the duck situation by putting out of business some of the most notorious "bull-hunters," against whom a vigorous campaign was waged. We confidently believe this season will put an end to their further operations.

While no recommendations were made by this Commission with reference to a change from the season when deer could be lawfully killed (July 15th to October 1st), a number of bills on that subject were introduced in both houses. After fierce debating and many amendments a compromise was finally decided upon, making an open season of three months, from August 1st to November 1st. Unfortunately through a clerical error, a misprinted bill, or one that never passed the Senate, fixing the open season July 15th to November 1st, received your signature. There being so much confusion over the matter, the Attorney General was appealed to and in an exhaustive opinion he advised us to recognize the open season from July 15th to November 1st, or three and a half months, and we have been governed accordingly. In our opinion this season must be shortened at least one month, and the opening date fixed at August 1st, closing date October 15th. While this still leaves a very generous open season, we believe the increase in deer in all the northern and central counties, also the counties reaching the Sierra Nevada Mountains, due to the bounty paid on mountain lions, will warrant it. The exception is in southern California, embracing the counties from San Luis Obispo southward, where, owing to devastations by forest fires, deer cover has been greatly reduced, and through remarkable increase in population with approximate increase in the number of deer hunters the deer have become scarce.

The legislature acted favorably upon our recommendation with respect to placing wild turkeys on the protected list. This action was timely, as the birds that had been liberated in the San Bernardino Mountains, Sequoia Park, eastern Tulare County, and in the Yosemite National Park are showing an encouraging increase.

The change in the law relating to pheasants, whereby the restrictions were removed from those raised in captivity, has proven of great advantage to pheasant raisers. It has given encouragement to many who had started in a small way and found themselves with a considerable number of birds on hand, and no legal means to dispose of them. It also permits them to be freely transferred from one part of the State to another and sold for purposes of propagation, but withholds the right to sell for market purposes. We believe, however, that further encouragement should be given by allowing those raised in captivity to be sold in the markets under proper restrictions.

Some important changes have also been made with respect to the laws governing the taking of fish. We recommended at the thirty-eighth session of the legislature that the law on crabs be changed by raising the then existing close season, September and October, and establishing in lieu thereof a close season of four months beginning November 1st and ending on March 1st of the following year While this was a step in the right direction, we do not consider it sufficient, and will recommend that a close season of two years be established.

The legislature acted favorably upon our recommendation with respect to establishing a close season for the taking of striped bass with nets or seines, fixing the time from the first of May to the first of July of each year, and permitting their capture by hook and line only during that period. A reduction was also made in the legal mesh of nets with which these fish could be captured from 7½ to 5½ inches. It seemed inconsistent that while striped bass might be taken and legally possessed weighing not less than three pounds, a 7½-inch mesh net would not capture one weighing less than five or six pounds. This offered a great temptation to the fishermen and resulted in many infringements. The legal mesh for the taking of salmon was also reduced from 7½ to 6½ inches.

Our recommendation for a close season of at least two years on lobsters or crawfish was met by fixing an indefinite close season on the taking of them in the waters of California, but permitting crawfish or lobster that were taken without the waters of this State to come in under prescribed restrictions.

Section 632½, referring to the steelhead trout, was amended by removing the close season that existed concurrent with the salmon law from September 17th to October 23d, and fixing a total weight limit in one day at 50 pounds. This met with much favor from all anglers.

The law was further amended by extending the open season and permitting their capture in any of the waters of the State from the first of April to the first of February of the following year, eliminating the tide water clause. So long as the prohibition against the taking of these fish with nets continues, no other restrictions are necessary. From a limited number of anglers a request was made asking that the taking of steelhead be permitted at all seasons of the year, with which we have not agreed, as we believe they should have protection while on their spawning beds—the principal months for which are February and March, the present close season.

During the thirty-eighth session of the legislature, the title of the Commission, which had remained the same since the establishment of this department in 1870, was changed from "Board of Fish Commissioners" to "Board of Fish and Game Commissioners."

To simplify the keeping of accounts, not only in our own office, but in the offices of the State Treasurer, State Controller, and Board of Examiners, the balances remaining in the fish commission fund and the game preservation fund were combined into one fund, known as the fish and game preservation fund, into which are paid all moneys arising from the sale of hunting licenses and of fines collected for violations of any of the fish and game, and fish and game license laws of the State, and providing further that this fund shall be applicable to the payment of the expense of propagating, protecting, restoring, and introducing *game fish* into the public waters of the State, and to the propagation, protection, restoration, and *transferring* of *game birds* and animals in this State, and to the *introduction* of game birds and animals into the State, and to the payment of the expenses incurred in the prosecution of offenders against the fish and game, and fish and game license laws of the State, and to all other necessary expenses approved by the Fish and Game Commissioners.

The State now appropriates only $20,000.00 per year, and that for the support and maintenance of the commercial hatcheries (being at the rate of only one cent per head on the estimated population of two millions), to which is added the amount, approximately $22,000.00, arising from the sale of commercial fishermen's licenses. This fund is applicable to the payment of the expenses of "propagating, protecting, restoring, and introducing *commercial* fishes into the public waters of this State, and all other expenses pertaining thereto."

The sportsmen who pay for hunting licenses are not contributing toward the support of the commercial hatcheries, as is sometimes charged. All fines of whatever character, amounting approximately to $20,000.00 per year, are paid into the fish and game preservation fund, which more than meets the expense involved in the propagation of game fishes.

Section 642 of the Political Code was amended by amplifying the powers of the Fish and Game Commissioners and their deputies, authorizing them to seize and take possession of any and all game or fish or any part thereof which have been caught, taken, killed, had in possession or under control, sold, offered for sale, or shipped, or offered for shipment, contrary to any laws of the State, and providing that any game or fish so seized shall be by them donated to some charitable or public institution. This amendment has proven of value, but far better results would be obtained were our deputies granted the "right of search," following in that respect the example of New York, Maine, Minnesota, Massachusetts, Colorado, Washington, and many other states. The deterrent effect alone of such a law would be very great; it would simplify the work of our assistants, and, in short, its value to fish and game preservation can not be overestimated.

Another important amendment to this section gave the Fish and Game Commissioners the right to acquire, by lease or otherwise, such lands as may be deemed necessary for the purpose of establishing state game farms. Under this authorization we were able to carry out our plans and established our first game farm near Hayward, Alameda County.

ALLEGED TRUST OF DEALERS IN FISH.

This Commission views with approval the activity of the Attorney General and the district attorney of the city and county of San Francisco in investigating the alleged existence of an illegal combination or trust among fish dealers. Although such illegal combinations may affect species of fish propagated and distributed by this Commission and make it possible to sustain market prices by selling any surplus to fertilizing plants, investigations or prosecutions instituted thereon are entirely beyond and outside of the province of the Board, under the authority and powers now vested in it. And in this connection this Commission suggests to you that it might be advisable to call the attention of the legislature to the fact that an act regulating and licensing fish dealers by this body and give to it the necessary power to cancel such license upon conviction of violation of the laws protecting fish would be a most effective means of curbing such evils.

ARRESTS AND FINES.

The following statement gives in brief the history of our work as it relates to the efficiency of the patrol force. It indicates that the work has been thorough and far-reaching, and covers every class of offense relating to the fish and game laws, and it has reached practically every corner of the State. This statement is taken from the docket kept in our office, which shows all the cases in detail, but in a report of this kind it is necessarily abbreviated. Three fourths of the cases have been made by our regular deputies—the remainder by men of the United States Forestry Service and others interested in this work who have been empowered by us with authority to make arrests for violations of these laws. Especially good service has been rendered by forest rangers acting under service order No. 22, which is as follows:

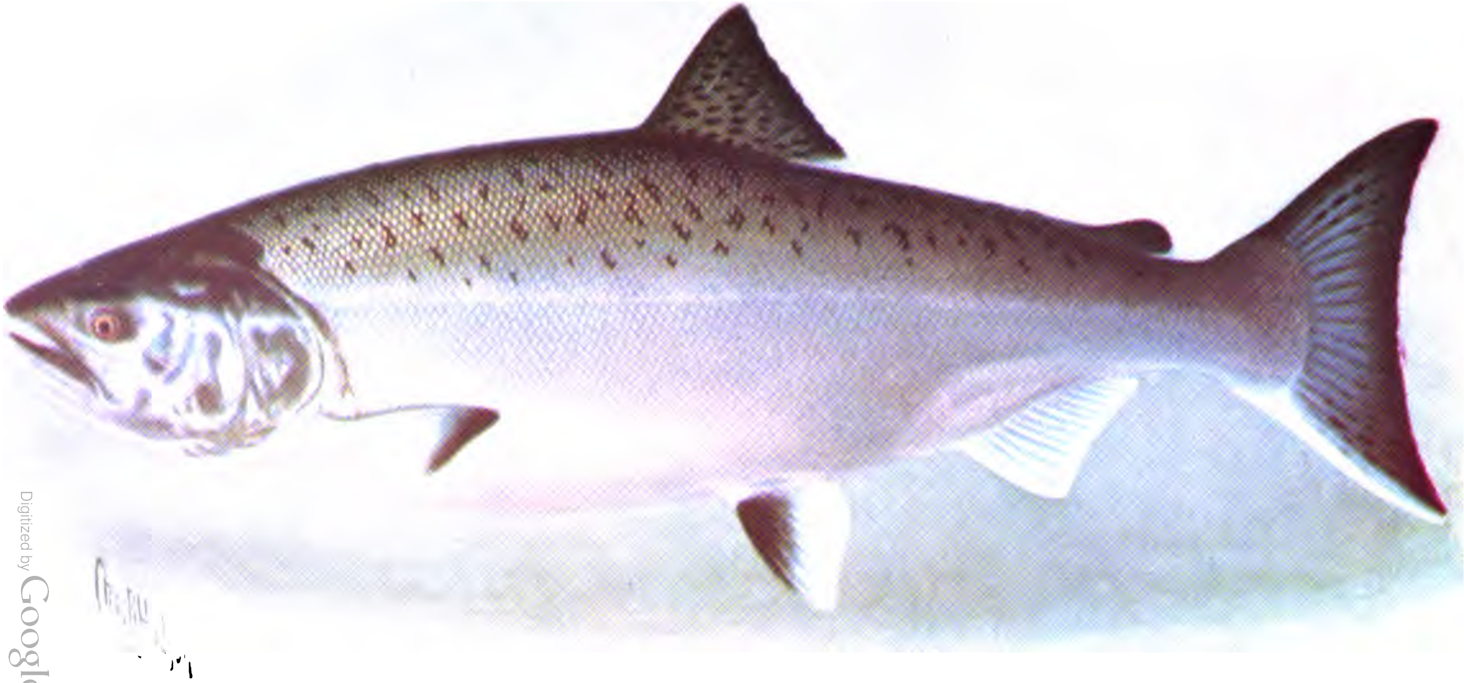
> SERVICE ORDER NO. 22.
>
> WASHINGTON, D. C., September 25, 1908.
>
> OBSERVANCE OF STATE LAWS BY FOREST OFFICERS.
>
> It has recently been brought to the attention of this Service that forest officers themselves have in rare instances failed to observe the State game laws. Strict observance, both by act and example, of all State laws, whether for the protection of game or for other purpose, is one of the first duties of every forest officer. Under no circumstances should one forest officer shield or condone the act of another who violates the game laws. To do so differs little from actual violation of the law itself. This Service will not tolerate violation of the State game laws by any of its members, or failure to coöperate fully with State game officials.
>
> GIFFORD PINCHOT, Forester.

We desire at this time to express our appreciation for the valuable assistance rendered by that department.

It will be observed that in by far the larger number of cases the defendants pleaded guilty, which may be taken as an indication of the thoroughness with which the evidence had been collected. But in addition to the cases which were actually brought into court, hundreds of complaints have been examined, some of which we found had not been made in good faith; others in which sufficient evidence was not obtainable to justify a prosecution.

Many seizures of fish and game that had been shipped (or offered for shipment) in violation of the statutes, or had been killed contrary to law, were made. In many of these cases, convictions followed the seizure. In others, owing to use of fictitious names, we were unable to locate the shipper, but some punishment was effected by confiscation of the game or fish, which meant a loss of time, labor, and the goods.

At the thirty-eighth legislative session the right was given to the Fish and Game Commissioners and assistants to seize and take possession of any and all game or fish, or any part thereof, which had been taken, killed, or had in possession or under control, or sold, or offered for sale or shipped, or offered for shipment, contrary to any of the laws of this State. It provided further that all such game or fish, or any part thereof, which might be so seized or taken possession of by the Fish and Game Commissioners, or their assistants, shall be donated by them to some charitable or public institution. Practically all institutions of that character in and around San Francisco and the other larger cities of the State have been beneficiaries under this law, and from many of them we have received grateful letters of acknowledgment.



QUINNAT SALMON (*Onchorhynchus chouicha*)

DRAWN FROM FEMALE FISH TAKEN AT MONTEREY, CAL., MAY 1910

FISH CASES.

Summary of arrests made by deputies of the Fish and Game Commission, and disposition of cases for two years, ending August 31, 1910.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days' imprisonment.
85	Fishing without a license	78	1	6	$820 00	100
57	Young of fish, catching or possession	81	------	26	695 00	------
62	Using Chinese shrimp or bag nets for the purpose of taking fish (43), close season (11), exporting (8)	40	------	22	3,630 00	------
36	Using small mesh nets to take striped bass	9	2	25	625 00	550
35	Using set nets to take salmon and striped bass (1 pending)	29	------	5	2,900 00	275
14	Nets extended more than one third across stream (striped bass)	4	1	9	425 00	------
6	Using wire traps or nets for the purpose of catching fish	6	------	------	575 00	------
20	Using explosives	14	1	5	926 00	1,062
13	Polluting waters of State (sawdust, oil, etc.). See note	1	2	10	250 00	------
3	Taking fish within 50 feet of fishway	1	------	2	100 00	------
21	Salmon, catching or possession, close season (2 pending)	6	------	13	950 00	------
6	Saturday and Sunday fishing for salmon, shad, and striped bass	2	------	4	210 00	------
40	Striped bass, underweight, catching or possession	34	1	5	775 00	------
1	Sturgeon, catching or possession, close season	1	------	------	20 00	------
23	Black bass, close season, bag limit, catching by other means than hook and line, etc	23	------	------	620 00	130
2	Sacramento perch, close season, spearing, etc	2	------	------	25 00	20
82	Trout, close season, bag limit, undersized, buying or selling underweight, etc	65	2	15	1,415 00	185
28	Steelhead, close season, spearing, etc	16	2	10	300 00	------
2	Golden trout, close season, bag limit, etc	2	------	------	50 00	------
162	Crabs, close season, undersized, female	110	------	52	1,990 00	103
18	Abalones, close season, possession	14	2	2	345 00	------
20	Crawfish, close season, undersized	16	2	2	355 00	------
8	Catfish, undersized	5	------	3	125 00	------
7	Taking surf fish by other means than hook and line	7	------	------	130 00	------
1	White fish, catching or possession	1	------	------	20 00	------
2	Lobsters, illegal shipping	2	------	------	------------	150
754	Totals	519	16	216	$18,276 00	2,575

Three cases pending.

NOTE.—In these cases, all of which represent actions against corporations, the charges were dismissed after the court and the board were satisfied that the repair and other work done by the defendants, amounting in the aggregate to $39,650, rendered further pollution impossible.

GAME CASES.

Summary of arrests made by deputies of the Fish and Game Commission, and disposition of cases for two years, ending August 31, 1910.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days' imprisonment.
351	Violation of hunting license law (2 pending)	300	10	39	$3,936 50	20
42	Doves, close season, killing or possession	38	3	1	945 00	------
2	Doves, bag limit, concealed package	2	------	------	75 00	------
3	Doves, buying or selling	3	------	------	75 00	------
22	Ducks, close season, killing or possession	15	5	2	418 00	2
66	Ducks, bag limit (1 pending)	45	4	16	1,345 00	------
5	Ducks, netted (drowned)	3	------	2	75 00	------
1	Ducks, illegally shipped, concealed package	1	------	------	25 00	------
6	Shooting ducks from power boat while in motion	4	1	1	70 00	------
13	Using a trained animal for the purpose of killing wild ducks or geese	3	10	------	50 00	------
34	Night shooting (2 pending)	17	6	9	375 00	------

GAME CASES—Continued.

Number of arrests	Violation charged with.	Convicted	Acquitted	Dismissed	Fine.	Number of days imprisonment.
10	Shooting on enclosed grounds (trespass)	8	------	2	$140 00	------
4	Hunting on Pinnacles National Forest Reserve without permit, and State game preserve	4	------	------	220 00	------
4	Mountain quail, killing or possession	4	------	------	100 00	------
72	Quail, close season, killing or possession	62	1	9	1,747 00	103
10	Quail, bag limit	5	------	5	200 00	------
5	Quail, buying or selling	2	------	3	150 00	------
5	Trapping quail or having quail or quail eggs in possession without permit, illegally shipped	5	------	------	100 00	------
9	Snipe, close season, bag limit, etc.	7	------	2	175 00	------
10	Curlew, rail and plover, close season	7	------	3	175 00	------
105	Non-game birds, meadow larks, robins, eagle, condor, swans, sea gulls, and other shore birds	84	2	19	1,185 00	------
2	Pheasants and Hungarian partridges, close season	1	------	1	25 00	------
105	Deer, killing, pursuing, possession, close season, illegally shipped	82	9	14	2,149 00	61
6	Deer, bag limit	4	2	------	65 00	35
17	Deer, pursuing with dogs	12	1	4	225 00	60
56	Female deer and fawns, killing (2 pending)	36	8	10	1,747 00	143
26	Female deer or spotted fawn hides in possession and deer hides in possession, evidence of sex removed	9	10	7	250 00	25
3	Deer hides, buying or selling (2 pending)	1	------	------	25 00	------
1	Elk, killing or possession	1	------	------	50 00	------
4	Antelope, killing	1	------	3	75 00	------
18	Tree squirrels, close season, killing or possession	15	2	1	350 00	------
1,017	Totals	781	74	153	$16,492 50	449

Note.—Nine cases pending.

Seizures of Nets, Fish, and Game Made by Deputies.

September 1, 1908, to September 1, 1910.

49 set nets. Owners unknown. Destroyed under section 636*a*, Penal Code.

11 small mesh nets (salmon and striped bass). Owners unknown. Destroyed under section 636*a*, Penal Code.

22 Chinese shrimp nets.*

3,248 pounds of salmon. Donated to charities.
8,157 pounds of striped bass. Donated to charities.
1,510 pounds of black bass. Donated to charities.
2,842 pounds of steelhead trout. Donated to charities.
2,272 pounds of trout (rainbow, Eastern brook, and cut-throat). Donated to charities.
725 pounds of shad. Donated to charities.
880 pounds of catfish. Donated to charities.
580 pounds of small smelt. Donated to charities.
417 pounds of crawfish. Donated to charities.
628 crabs. Donated to charities.
236 abalones. Donated to charities.
87,290 pounds of California shrimp shells.†
1,255 pounds of California shrimps† (dried).
380 dozen ducks. Donated to charities.
14 dozen doves. Donated to charities.
34 dozen quail. Donated to charities.
7 dozen snipe. Donated to charities.
1 dozen gray squirrels. Donated to charities.
14 dozen plover. Donated to charities.
30 dozen non-game birds. Donated to charities.
425 dozen murre eggs. Donated to charities.
162 rabbits. Donated to charities.
250 pounds of venison. Donated to charities.

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*Returned after settlement of cases.

†Returned to the owners by order of the court.

The above table indicates that upwards of 20 tons of fresh salmon* were seized which had been shipped into the State contrary to law. Over 40 tons of dried shrimp and shrimp shells*; upwards of four tons of striped bass; more than two tons of trout of the different varieties; more than 1,500 pounds of black bass, were seized, all of which indicates the vigilance of our patrol force.

The set nets and small mesh nets that were taken, and by order of the court destroyed, represented a considerable money value and miles of netting. There were fewer arrests of individual fishermen for violation of the salmon and striped bass laws than in the two preceding years, owing, we believe, to the watchfulness of our patrol and the successful prosecutions that followed, especially in Solano County. This also accounts for the larger number of seizures of illegally used gear, as fishermen rather than risk being caught in the use of the nets would set and leave them, returning when the time seemed most favorable to avoid detection. A conservative estimate of the total value of the illegally used nets destroyed is $10,000.00.

As to game, upwards of 380 dozen ducks, 34 dozen quail, 14 dozen doves, 30 dozen non-game birds of different varieties, besides snipe, plover, gray squirrels, and rabbits were seized and donated to different charities in and around San Francisco, the Almshouse being one of the largest beneficiaries. Grateful letters of acknowledgment have been received from many of these institutions.

For the two years ending August 31, 1910, the total number of arrests made is 1,771, as against 1,192 for the preceding two years, showing a gain of 579. Of this number 752 were for violations of the fish laws, and 1,017 for violations of the laws relating to game. The total amount of fines imposed aggregate the substantial sum of $34,768.50. Of this amount $18,276.00 was paid for violations of the fish laws, and $16,492.50 for violations of the game laws. In some cases the defendants served time and paid a small amount into the county treasury. In other cases the magistrate imposed a fine without alternative, thus giving the defendant an opportunity to seek new fields. The total number of days' imprisonment served for violation of the laws aggregated for the biennial period 3,024 days.

The largest aggregate *amount in fines imposed* for violations of any single section of the Penal Code was upon the Chinese shrimp fishermen and dealers engaged in the capture and handling of California shrimp, for which 119 arrests were made, penalties imposed amounting to $4,325.00. The largest number of *arrests* for violations of any one section was for infractions of the hunting license law in various forms, 351 men having been apprehended during the two years, and a total of $3,936.50 imposed in fines.

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*Returned to the owners by order of the court.

The next in number of arrests was for violations of various sections of the laws relating to the protection of deer, for which offenses 211 arrests were made, of which 56 were for killing does or fawns, and for which fines amounting in the aggregate to $1,747.00 were imposed.

Seventeen arrests were made for running deer with dogs, out of which 12 convictions were obtained; 6 arrests were made for exceeding the bag limit on deer, 27 for violating the laws relating to possession and sale of illegal deer hides. For fishing for profit, without a license, 85 arrests were made, and fines amounting to $820.00 imposed, as compared to 5 arrests for this offense in the preceding biennial period.

FINANCIAL STATEMENT.

The resources and expenditures of this Commission for the sixtieth and sixty-first fiscal years, beginning July 1, 1908, and ending June 30, 1910, are shown as follows:

SIXTIETH FISCAL YEAR—1908 AND 1909.

	Resources.	Disbursements.
Support and Maintenance of Hatcheries Fund—		
Appropriation for year	$20,000 00	
Amount drawn during the year		$20,000 00
Restoration and Preservation of Game—		
Appropriation for year	10,000 00	
Amount drawn during the year		10,000 00
Restoration and Preservation of Fish—		
Appropriation for year	10,000 00	
Amount drawn during the year		10,000 00
Fish Distribution Car—		
Balance on hand July 1, 1908	2,041 24	
Amount drawn during the year		2,041 24
Appropriation for Fish Repository in Tuolumne County—		
Balance on hand July 1, 1908	200 05	
Balance on hand June 30, 1909		200 05
Game Preservation Fund—		
Balance on hand July 1, 1908	73,359 66	
Receipts from hunting licenses	113,476 93	
Receipts from fines	15,565 41	
Fish Commission Fund—		
Balance on hand July 1, 1908	6,391 04	
Receipts from fisherman's licenses	6,647 50	
Receipts from eggs sold to Germany	875 00	
Amount drawn during the year on these two funds, which were combined by law March 15, 1909, includiung expenses June, 1908		139,162 52
Balance on hand July 1, 1909		76,653 02
Totals	$258,056 83	$258,056 83

SIXTY-FIRST FISCAL YEAR—1909 AND 1910.

	Resources.	Disbursements.
Support and Maintenance of Hatcheries Fund—		
Appropriation for year	$20,000 00	
Receipts for fisherman's licenses	21,982 50	
Amount drawn during the year		$41,982 50
Fish and Game Preservation Fund—		
Balance on hand July 1, 1909	76,653 02	
Receipts from hunting licenses	126,734 85	
Receipts from fines	19,789 27	
Game farm earnings	938 22	
Amount drawn during the year		150,796 65
Balance on hand June 30, 1910		73,318 21
Appropriation for Fish Repository in Tuolumne County—		
Balance on hand July 1, 1909	200 05	
Balance on hand June 30, 1910		200 05
Totals	$266,297 41	$266,297 41

In the Appendix will be found a report on the books and accounts of this Commission by Price, Waterhouse & Co., "Certified Public Accountants," for the biennial period ending June 30, 1910, and an additional report on account of the years 1910–11, from July 1st to August 24th, 1910, inclusive.

SISSON HATCHERY.

This station is operated under the supervision of Mr. W. H. Shebley, whom we regard as one of the ablest and most skillful fish culturists of this country. Combined with his good practical judgment, Mr. Shebley unites the results of twenty-five years' experience and deep study of the scientific side of all questions relating to fish culture—with special reference to salmon and trout. The splendid results accomplished at this hatchery are due almost solely to the intelligent zeal with which this work has been carried on under Mr. Shebley's direction. With regard to its location and equipment, it has no superior in this country or any other.

While the output of salmon fry was less than in the preceding biennial period, this was not due to a scarcity of salmon at the spawning stations or lack of effort on the part of the employees of the United States Federal Bureau of Fisheries to capture them. Unusual freshet conditions prevailed, which raised the waters to such a stage on the McCloud River and in Battle and Mill creeks that thousands of salmon impounded between the racks were permitted to escape, either by swimming over the obstructions or by the carrying out of entire sections; although comparatively a smaller number of eggs were taken, a high percentage of hatch was achieved. On the other hand, the output of trout fry from this station has enormously increased.

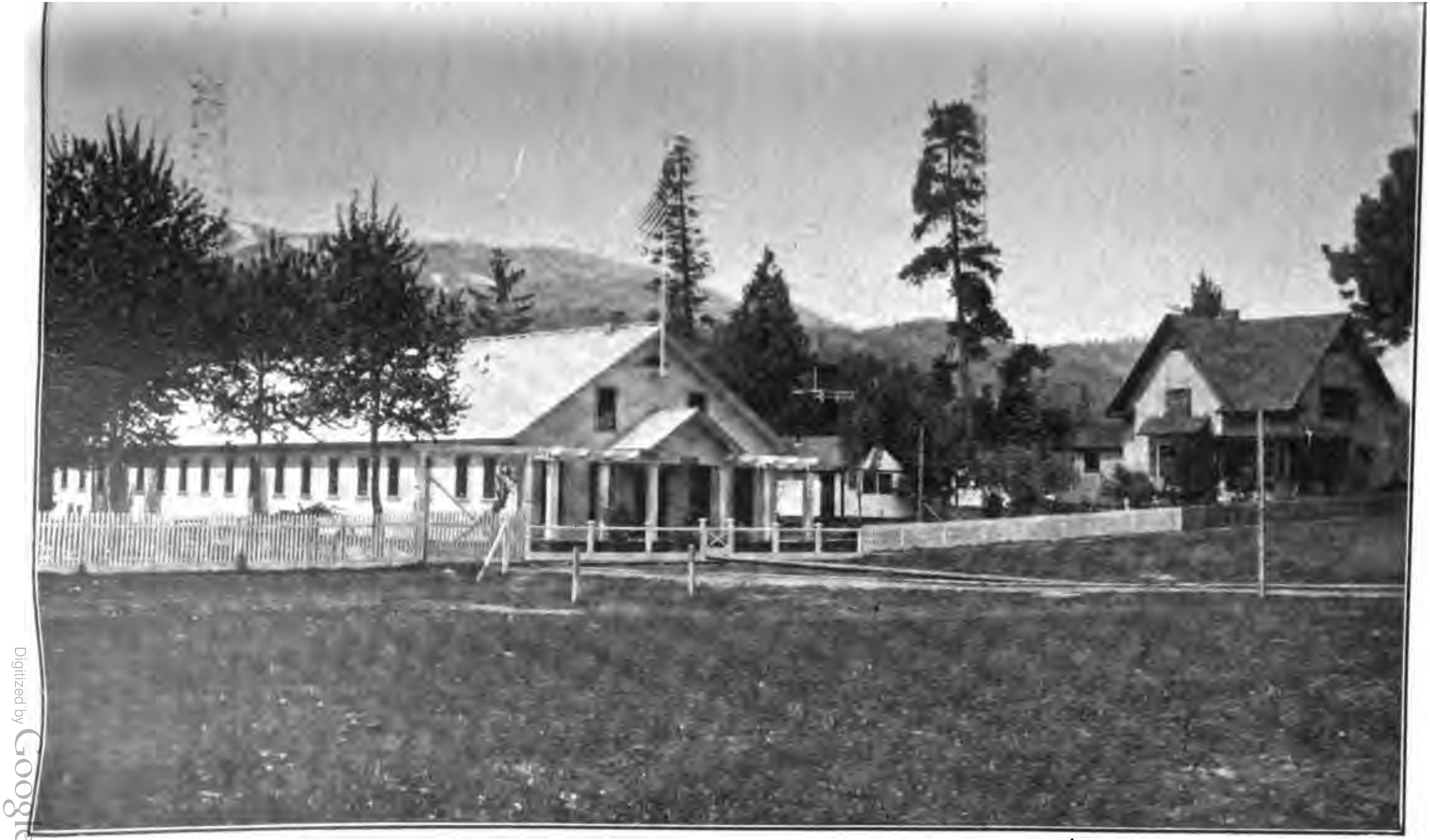
For the purpose of comparison, we submit the following statement showing the output of this station in 1900, or ten year ago, with the output for the present fiscal year, also an interesting view of the hatchery taken twenty years ago:

	1900.	1910.
Salmon fry	1,651,000	22,500,000
Rainbow trout fry	560,000	5,205,000 *120,000
Cut-throat trout fry	90,000	150,000
Loch Leven trout fry	264,000	1,484,000
Eastern brook trout fry	6,000	1,000,000
Steelhead trout fry		303,000
German brown trout fry	136,000	
Totals	2,707,000	30,762,000

*120,000 hatched at Shovel Creek.

While the total distribution from this station for the year 1907 reached 67,000,000 and 60,000,000 in 1908, this was due to the larger

Tallac Hatchery.



Hatchery "A," Sisson, 1910.

number of salmon eggs that were collected at the three Federal salmon egg-collecting stations.

The work of the Federal Bureau of Fisheries is under the able direction of Capt. G. H. Lambson, who confidently expected to break all records in the number of eggs collected during the fall of 1909, there being more spawning fish impounded between the racks than at any time in the fifteen years he has operated on the streams in our State. The unusual November rains brought such a flood down Battle Creek that the racks, piling, and all were swept out, and the water continued at such a high stage that it was impossible to replace them until after the entire run of salmon had passed on to head waters. For details of the work that has been performed at Sisson for the past four years, we refer you to Mr. Shebley's reports, which will be found in the Appendix.

This station is now in first class condition, and the improvements are all of a substantial and permanent character and will require only the ordinary charges of maintenance.

THE SALMON LAW.

At the thirty-eighth session of the legislature we recommended a change of five days on the close season for the taking of salmon. We suggested that the close season begin on the 15th of September instead of September 10th, and end October 21st instead of October 16th. There was a general complaint from the canneries and cold storage plants to the effect that the fall run of salmon was appearing later; that the close season commenced before the run had reached its height, and that the bulk of the fish were passing the fishing grounds during the close season, Together with the fisherman, they asked for two weeks' extension of the open season. It resulted in a compromise, and a change of one week was effected. The close season now begins September 17th and ends October 23d. No change, however, was made in the very important feature of the law which prohibits the taking of salmon above tide water before the 15th of November. For years the importance of the tide water clause was imperfectly understood, and provoked a great deal of criticism from the fisherman living along the upper Sacramento and San Joaquin rivers, who did not realize that but for this restriction there would be nothing to prevent many of the five hundred boats that fish in the lower rivers from following the schools of salmon up the rivers, which would result in practically capturing all of them before reaching the spawning-grounds. Without the protection given the salmon under the law, the Federal Bureau of Fisheries stations would not be able to take a sufficient number of eggs at the spawning stations to justify carrying on the work of artificial propagation, which has been the salvation of the salmon supply in our waters, and would in a very short time result in the extermination of the species in the Sacramento River.

The high price of salmon that has prevailed for the past three or four years has been an incentive for more men to engage in the business. The improved method of handling the fish and the better transportation facilities have given the Sacramento salmon almost a world-wide market, which was fully set forth in our nineteenth biennial report. The constantly increasing market is a most important factor in keeping up the price; and this induces the fishermen to extra effort, which is shown on the upper Sacramento, where by the removal of snags and other obstructions in the river new seining grounds have been cleared off, permitting the operations of more nets during the spring run. This has had the effect of reducing the take of eggs from the summer run at Baird Station. We see no reason for any change in the law as it applies to the fall run, but it is not at all unlikely that additional restrictions may be necessary upon the capture of the spring run in order to permit a larger number of parent fish to reach Baird. As the spring fish commands about double the price of the fall run, such a recommendation would meet fierce opposition; nevertheless, if careful investigation shows that increased spring fishing decreases the supply of parent fish at the hatcheries, such additional restrictions should be imposed in spite of any opposition.

At the thirty-eighth session of the legislature we recommended that the mesh of net with which salmon could be legally taken should be reduced from 7½ to 6½ inches. This recommendation which had the endorsement of Dr. C. H. Gilbert of Stanford University, who has made a very careful study of the subject, became a law. A recommendation on the same lines had been made by the late Cloudsley Rutter, who was considered one of the best informed authorities on the Pacific coast salmon. He found that a great many small but matured fish were passing through the nets and making their appearance in large numbers between the racks at the spawning stations, where they were regarded as a nuisance. It is not considered desirable to breed from the smaller stock. As these fish have a positive food value before reaching the headwaters of streams, where they spawn and die, it was considered that an important food supply was being wasted, when with a smaller mesh net they would be captured while in prime condition for fresh market use. It was found that the fishermen operating in Eel River, also in the upper Sacramento, who use cotton nets, which were of legal size when new, but shrunk to 6½ inches when in actual service, were substituting sections of still smaller mesh. We therefore recommended another amendment, making it unlawful to use a net for the taking of salmon, shad or striped bass, "any of" the meshes of which were less than prescribed by law. We also had substituted the word "use" for the word "set" in section 636. This also removed another legal snag that had caused the dismissal of several cases, as it had been successfully argued that the law was misleading; that it was not a positive prohibition against setting a net, and it had been so construed in one or two cases. We have now a better and more closely drawn law, the provisions of which can not be so easily evaded.

To further advance the salmon interests, we have with the coöperation of the Federal Bureau of Fisheries undertaken the establishment of a salmon egg-collecting station on the Klamath River in Siskiyou County, near the town of Klamathon, the expenses of installation to be borne jointly, the Bureau to pay operating expenses, and the hatching and distribution to be done at and from Sisson at our expense.

That the supply of salmon in the waters of this State is not only being maintained but positively increased through artificial propagation, there can be no question. The federated commercial bodies of Humboldt County in a petition to this Board, under date of May 27, 1910, asking that the capacity of the Eel River Hatchery be increased, call attention to the fact that "beginning in 1901, four years after the hatchery was established, the amount of fish caught increased very rapidly, so that for the five years 1903–1907, inclusive, the annual average of shipment was over 3,000,000 pounds, as against an annual average of about 300,000 pounds before the hatchery was established."

In spite of such trustworthy evidence there are still some who fail to appreciate what has been accomplished, and look upon the artificial propagation of fishes with mild toleration, and point backward to the "good old days" when "a man could cross the river on the backs of the salmon without getting his feet wet."

In support of our contention and as evidence of the value of our work, we append herewith three comparative tables showing the number of pounds of salmon taken in three periods of four years each, the first commencing in 1874 (or thirty-six years ago), and extending to August, 1878, the second showing the amount taken (each year) for the years 1893–94–95–96, and the third being *an approximation* of the number of pounds of fresh salmon taken in 1907–08–09–10.

Years.	Pounds.
1874-1875	5,098,781
1875-1876	5,311,423
1876-1877	6,492 563
1877-1878	6,520,768

It was submitted by the Fish Commissioners in their report for the years 1878–79 to Governor Wm. Irwin that "to the weight of salmon actually taken to market by rail and steamboat, and the salmon actually tinned, we have added 25 per cent, the total being a close approximation of the actual catch for the season."

The following figures for the years 1893 to 1896, inclusive, were taken from the books of dealers and transportation companies and display the actual catch of those years:

Years.	Pounds.
1893	3,950,378
1894	4,494,618
1895	4,350,375
1896	3,276,587

It will be observed by reference to the second table that there was a decided decrease; but dating from that time a remarkable increase is shown, due to larger experience and improved methods; but the most important factor was the establishment of more spawning stations, beginning with one established by this Commission on Battle Creek, Shasta County, in 1895. This station produced in its first year of operation upwards of 14,000,000 salmon fry, which exceeded the total number ever planted in any previous four years and marked the commencement of a new era in salmon propagation. The United States Bureau of Fisheries located in 1901 a spawning station on Mill Creek, in Tehama County, and also acquired from the State its property and rights on Battle Creek, and has continued to operate with great success both stations, delivering to us free of cost practically the entire output of these stations and a large proportion of those taken on the McCloud River.

Years.	Pounds.
1907	9,111,200
1908	8,001,750
1909	11,211,400
1910	10,256,600

The third table, submitted by us, is based on the number of tierces of salmon actually packed, of which there is a record furnished by Mr. F. E. Booth of the Sacramento River Packers' Association, and to which is added an estimate made by dealers of the number of pounds of fresh salmon sold in the San Francisco markets. We do not include the fresh salmon which is shipped from Tehama and Chico into Oregon and Washington, nor from Sacramento to Eastern States, nor that which is sold and consumed in the local markets of Sacramento and Stockton, which, based on such figures as are obtainable, approximates 800,000 pounds annually.

STRIPED BASS.

From the commercial standpoint, the striped bass stands next in value to the salmon as a food fish in this State. It is also one of the most highly prized of the game fishes, being eagerly sought after by thousands of anglers throughout the State. The principal breeding grounds, so far as we have been able to determine by close observation of the subject for the past three years, are in the deltas of the Sacramento and San Joaquin rivers, although after spawning they range well into the interior of the State. Specimens have been taken in the Sacramento River as far northward as Kennett, in the Feather River above Oroville, and in the San Joaquin River as far upstream as Polasky. As a table fish they are second to none, and the question of maintaining the supply in the State has received our earnest consideration. In the nineteenth biennial report, considerable attention was called to the advisability of attempting to increase the supply by artificial propagation. The funds of this Commission at that time being insufficient to bear the expense unaided, the subject was taken up with the authorities of the United States Bureau of Fisheries at Washington, with the result that Capt. G. H. Lambson, in charge of the salmon hatching work of the Federal Bureau of Fisheries in California, was instructed to coöperate with this Board. Accordingly, in the month of May, 1907, operations were commenced at Bouldin Island, on the San Joaquin River, at which point a small hatchery building was constructed at the expense of this Commission. A small pumping plant for the purpose of raising water into two tanks of 2,000 gallons each to furnish the necessary amount of water for hatching operations was also installed. The equipment of the hatchery, McDonald hatching jars, were furnished by the United States Bureau of Fisheries. That department furnished three, and this Commission two men, but we assumed the expense of boat hire. During the first season we worked considerably in the dark. There was much to be learned concerning the habits of the fishes; how to distinguish those that were ready for spawning from the immature ones. It was found that by the same methods followed in "stripping" trout and salmon, the eggs and milt could be taken from striped bass, and yet neither the eggs nor milt be sufficiently matured to insure fertilization. The result was many eggs were taken that were apparently ripe, but which could not be definitely determined until after the eggs were placed in the hatchery Our total take of eggs for the first year's operations was upwards of eighteen million, which is about three times the amount of which there is any record that were taken on the Atlantic coast in a single season. The percentage fertilized and hatched, however, was small, and although we met with many discouragements, we were greatly pleased at the results that were obtained from certain lots of eggs. For example, in one lot of nearly 500,000 eggs, 95 per cent of hatch was achieved; in another 81 per cent.

During the past two seasons much attention was given to the movements of the striped bass before and after spawning, to trace the migration of both adult and young fish, which involved considerable exploration work. This, together with the scientific work, was under the direction of Mr. N. B. Scofield, a scientist, formerly of Stanford University, assisted by Mr. George A. Coleman, a biologist of experience. The station was supplied with a sufficient laboratory outfit to carry on a series of scientific investigations and studies, the results of which are shown in the Appendix, together with considerable data on the hatching of striped bass eggs, food of young striped bass, "Explorations made in connection with the work at Union Island, San Pablo Bay, and tributaries thereto," and the general report on the work for the season of 1909–10 by Mr. Scofield.

We recommended the establishment of a close season against the use of nets during the principal spawning months, May and June, but leaving the season open all the year so far as taking these fish with hook and line is concerned. We have been well satisfied with the results that have followed these amendments.

In the line of further recommendation, we would again call attention to the recommendation in the nineteenth biennial report of this Commission as follows:

> Another plan offered to offset the drain on the striped bass industry of this State is the passage of a non-export law, and there is much to be done in its favor. Our streams do not increase in volume; in fact, from the demands made by irrigating systems, it is possible to conceive that they will be reduced. It may then be the part of wisdom to conserve these valuable fishes for the citizens of our own State. Undoubtedly such a recommendation would meet with fierce opposition from the fish dealers in this city and Sacramento, who ship outside of the State thousands of pounds of striped bass each month. We feel that if these shipments may continue without impairment of the industry, and yet not run the local market value of these fish to a prohibitive figure, it would be an unwise move to prohibit their exportation.

Since this report was made the price of striped bass in our markets has reached a figure that is almost prohibitive to the man of small means. To supply the demand of the markets outside of this State we can offer an unlimited supply of a most delicious and valuable fish—the shad.

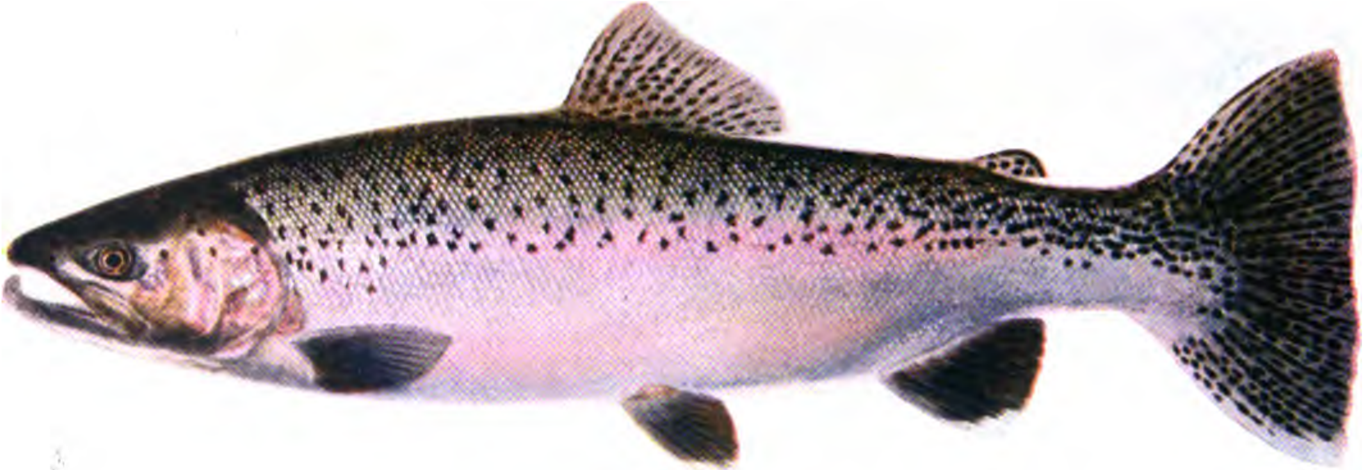
We believe that if the shipment of striped bass out of the State is prohibited, and the work of artificial propagation further developed, the result would show not only a decided increase in the supply, but a reduction in price to the average consumer of from 25 to 50 per cent.

In the line of distribution, a car load of these fishes ranging in size from 6 inches to 4 pounds in weight was collected in the Straits of Carquinez, at Port Costa, within two miles of where the original plant of bass was made twenty-seven years ago. They were transported without loss of a single fish to southern California and distributed in suitable waters of limited area in Orange County. This being the third shipment made into these waters in the past eight years, it should be sufficient to determine beyond all question their adaptability to the conditions found there. The natural range in this State seems to be from Monterey Bay northward as far as the mouth of Russian River, in Sonoma County.

THE TROUT LAW.

The opening date for the taking of trout was changed at the thirty-seventh session of the legislature from April 1st to May 1st. As compensation, the open season was extended two weeks from November 1st to November 15th, giving an open season of six and one half months. It applied to all varieties of trout except the steelhead, which could be legally taken, beginning April 1st, in tide water; but during the thirty-eighth session, the tide water restriction was removed, so they may be taken wherever found, beginning April 1st. While this has led to some confusion as to the identity of a steelhead, we believe that in the main the change has met with favor. Practically all the fish in our coast streams are of the steelhead variety. Under normal conditions the larger fish by the 1st of May have nearly all gone to sea or are hovering around in the deep pools from which they have easy access to the ocean when necessary to go there for food and protection. With the season opening on April 1st, thousands of our people who can not afford the expense of trips into the higher mountains would lose their only opportunity to catch trout, therefore we are not inclined to recommend any change of the opening date, as applied either to the steelhead or other varieties. We are, however, strongly of the opinion that six months of open season on all trout, except steelhead, beginning May 1st and ending November 1st, is ample and more liberal than any other state in the Union. Many eastern states grant only a three months' open season. Long before the 15th of November all genuine anglers have left the higher altitudes, and no sportsman really desires to take trout after that time, the exception being the market fisherman, the legality of whose operation can always be questioned. He fishes from the beginning of the season to the end, and takes advantage of every loophole in the law. Fish that happen to be of legal size are sent to market, everything under a pound in weight is disposed of through evasion or subterfuge. The two weeks now allowed in November simply give an additional opportunity to the market fisherman to deplete the streams when the fish are easily taken with bait. We, therefore, feel that the best interests of most of our people will be served by closing the general trout season on November 1st.

During the past two years efforts have been made in the direction of



STEELHEAD TROUT (Salmo gairdneri)

DRAWN FROM MALE FISH 23 INCHES LONG, TAKEN AT SWANTON, CALIF., FEBRUARY. 1910

raising trout artificially for market purposes. Enough has been accomplished to show that a new and profitable industry can be created in this State if an exception is made in the general law on trout in favor of those raised by private enterprise, by reducing the weight limit or size at which they can be legally sold. In a number of states in the Union—Utah, New York, Massachusetts, and Washington—it has developed into a profitable business. We believe in encouraging similar effort in our State. It would enable citizens and taxpayers to engage in a legitimate industry and supply with trout not only hotels and restaurants but the general public, without any drain whatever on the streams. This would in a short time, we believe, permit of a non-sale law on wild trout—a measure greatly desired by all anglers, as well as thousands of others who are not known as sportsmen, and yet enjoy their summer outings, provided the supply of trout in the mountain streams is maintained, which is almost impossible so long as the market fisherman has some shadow of legal excuse to ply his vocation. We believe our State offers excellent opportunities for the establishment on legitimate lines of such enterprises, which would mean the establishment of new industries, new avenues for profitable labor, with benefit alike to the angler for sport and those whose only opportunity to acquire trout is by purchasing them in the markets. We believe that the experience of other states would be a safe guide for us to follow, with regard to size and other restrictions that should be placed on the handling of trout raised in captivity to properly distinguish them from the wild trout of the streams and lakes.

TAHOE AND TALLAC HATCHERIES.

Since the last detailed biennial report of this Commission was printed important improvements have been made at these stations.

For several years we have had difficulty in getting a sufficient amount of good water to operate the Tallac Hatchery, besides which, its location was always a drawback, consequently a change was deemed advisable. After examining several sites offered by Messrs. Comstock and Lawrence, it was finally decided to locate the new hatchery on Taylor Creek at a point less than one half a mile above the spawning station. This creek, which furnishes our main source of supply of cut-throat trout eggs, is also the outlet of Fallen Leaf Lake, which will guarantee our water supply.

We were fortunate in securing a ten-year lease from the late Mr. E. J. Baldwin for three acres of ground, more or less, with water rights sufficient to operate the hatchery. The advantages of this location are many. In the first place it avoided hauling the eggs some three miles from the spawning grounds by sled over the snow to the old hatchery site, at which point there were no accommodations for the men. After the new site was decided upon, proper surveys were made and a concrete dam 75 feet long was placed in Taylor Creek to divert water into an iron pipe line, approximately 900 feet long. This pipe line was put underground and only emerges to the surface when the settling tank is reached. A building 40 by 70 feet, resting on concrete foundation, was then erected. Following the suggestion of Superintendent W. H. Shebley of our Sisson Hatchery, a radical departure was made in the arrangement of troughs. Instead of having a head trough on one side or end of the building, two head troughs were placed—one on each side of the building—permitting an aisle through the center.

The abundance of water permits each trough to be fed separately, and overcomes the disadvantages of having one feed into another—conveying excrement and possible disease into the lower one. The building was very solidly constructed, shingled overall, and forty troughs were installed, which give a capacity of about three million eggs, as against a million in the old hatchery. The total cost of this station complete was $3,534.00, which included all the labor and material used in its construction. It was paid for out of the fish commission fund. In the fall of 1909 a four-room cottage for the men was constructed in the enclosure of the hatchery grounds, at a cost of $750.00. This work was economically and substantially done. We believe for its purpose a more complete hatchery station can not be found.

At the Tahoe Station important improvements were also made. The foundation under the hatchery, which had done duty for many years, was taken out and entirely renewed, new porches added to hatchery and superintendent's cottage, and material ordered for new troughs, flooring, and an iron pipe line, to take the place of the old wooden flumes. The latter had been a menace for years, and permitted the escape through leakage in various ways of sufficient water to seriously curtail the output of the station. By the installation of this iron pipe line with laterals and small concrete dams at the various springs, shutting off the underflow, we expect to increase the water supply fully one third, which will permit of a substantial increase in the hatchery output as the demands justify.

The average number of cut-throat eggs taken from Taylor Creek for several years was about three million, our operations being limited to the capacity of the three stations—one and a quarter million to fill Tahoe Hatchery, a million for the Tallac Station, six hundred thousand to the Glen Alpine, and the remainder being distributed between Wawona, Sisson, and Ukiah hatcheries. For the season of 1910 the take was the largest ever made, being about 6,150,000 eggs—all taken from Taylor Creek.

This result furnishes an unanswerable argument to the criticism that is sometimes made, that the artificial propagation of fish is not a success. Eighteen years ago with a skillful force of men operating on sixteen creeks emptying into Lake Tahoe, from March 5th to August 15th, more than five months, the total take of eggs was 600,000, while in the present season operating on one creek only from March 27th to May 6th in less than six weeks our men collected upwards of six million eggs.

The Tahoe, Tallac and Glen Alpine hatcheries furnish all the cut-throat fry that can be distributed to advantage throughout the Tahoe and Truckee basins. In addition to Lake Tahoe, Independence, Donner and Webber lakes, a number of smaller ones on the western slope of the Sierras in the vicinity of Cisco receive their supply of cut-throat fry from this source.

All of the fish cultural operations in the Tahoe basin have been under the skillful supervision of Mr. E. W. Hunt, whose reports in brief will be found in the Appendix.

WAWONA HATCHERY.

Following the usual custom, this hatchery, which is located just within the confines of Yosemite National Park, has been successfully operated during the spring and early summer months for the past four seasons under the careful direction of Mr. M. L. Cross, one of our experienced and capable hatchery men. We have hatched and distributed from that station approximately 350,000 trout fry per year, the large majority of which were of the cut-throat variety, the eggs having been taken and shipped from Lake Tahoe. We have also shipped in rainbow eggs from Sisson, and Loch Leven fry, which were distributed in suitable waters.

In addition to the distribution made by Mr. Cross, in which he received the cordial support and assistance of Washburn Brothers, of Wawona, Major W. W. Forsyth, acting superintendent of the park, has borne an important part. A number of new lakes and inaccessible streams were stocked by United States soldiers, acting under his direction. He has also provided suitable conveyances to meet our fish distributing car at El Portal, and hauled the fish from that point into Yosemite Valley and from there distributed into lakes and streams rainbow, Eastern brook, and Loch Leven trout, sent in from the Sisson Hatchery.

That all this work has been intelligently performed is evidenced by the fact that practically all the lakes and small tributary streams are now teeming with fish, and it has been suggested by those most familiar with the conditions that our efforts in that direction be discontinued, and for the next two years be given solely to stocking Merced River and its larger tributaries.

In order to increase the present supply of trout in the main valley, Major Forsyth has prohibited fishing in its stream for one year—in the mean time stocking it heavily, with the hope of increasing its attractiveness by giving better fishing to the average angler, which result we believe will be accomplished when the present restrictions are lifted.

The Wawona Hatchery has also furnished fry sufficient to stock the head waters of the principal trout streams in Madera County, and also portions of Fresno County. This work was taken in hand by the Madera Sugar Pine Lumber Company, under the direction of Mr. Porter C. Thede, and Mr. W. B. Day of North Fork, and men of the United States Forest Service.

During the season of 1909 this station was visited by Commissioner Van Sicklen and Chief Deputy Vogelsang, to determine if it was feasible to change the source of water supply from the creek to the river. After giving the matter full consideration it was decided to build a new flume on the old site, and install a larger and more improved sand-box to take care of the débris, and orders were issued accordingly.

EEL RIVER SALMON AND STEELHEAD HATCHERY.

This valuable fish cultural station, located on Price Creek, one mile from its confluence with Eel River, in Humboldt County, continues to grow in importance every year, and fully justifies the forethought of our predecessors.

In our nineteenth biennial report we quoted extensively from the report made by the late W. A. Wilcox, statistician of the United States Bureau of Fisheries, Washington, D. C., showing by actual figures the remarkable increase in five years of the number of pounds of fresh salmon shipped from the port of Eureka following the establishment of this hatchery. The results are so apparent that practically all of the people of Humboldt County are now firm believers in the value of artificial propagation, and have, by petition presented through the federated commercial bodies of Humboldt County, requested that this hatchery be enlarged to double its present capacity.

A committee composed of representative men was appointed on October 19, 1909, to make a thorough investigation of the matter and submit a written report of its findings. This committee was named as follows: W. P. McIntyre, Fortuna, chairman; Theo. Van Duzer, Loleta; R. S. Fennaty, Ferndale; Brouse Brizard, Arcata.

A most interesting and intelligent report was made, submitting an estimate of the proposed improvements as $2,000.00. As to its reasons for asking this increase, we quote from the report:

> The amount of fish caught in Eel River and sold as an article of commerce for food supply was only about 300,000 pounds annually in 1899 and 1900, and of a value of less than $10,000.00 for either year. These amounts had been much surpassed in preceding years, but the stream had apparently been nearly fished out. But

beginning in 1901 (four years after the hatchery was established) the amount of fish caught increased very rapidly, so that for the five years 1903-7, inclusive, the annual average of shipments was over 3,000,000 pounds and the average annual value over $90,000.00. Much of this increase is attributed, both by sporting and commercial fishermen, to the gradually increasing effect of the hatchery output. And it is argued that an increase in the capacity of the hatchery will still further increase the supply of fish, and thus allow an additional number to be caught each year. And it is further desired to have some of the output placed in Mad River, so as to increase the supply in that stream, which is a small factor in the commercial production of fish, but a considerable one from the sportsman's standpoint.

Also, if the capacity of the plant be increased as requested, it would give an opportunity to handle more steelhead fry, which is greatly desired by the sportsmen fishermen. And on occasion, if the eggs could be procured, it would be very desirable to hatch out trout to replenish the smaller fishing streams of Humboldt County now pretty badly fished out.

For these reasons, and because of the comparatively small cost of the proposed increase in size of plant, we trust your Commission will give this matter your prompt and favorable consideration.

Respectfully,

[Signed.] W. P. McIntyre, Chairman,
For the Committee on Increase of Hatchery.

In our opinion this request should be met on this showing, which is further confirmed by the report of the Eureka Harbor Commission.

As a salmon hatching and distributing station it has no superior, being situated less than 20 miles from salt water, which removes to a great extent the dangers to which young fry are exposed in the passage through fresh water to their natural home, the sea. On the other hand, we do not consider the station so well located for the capture of steelhead in spawning condition, as the main runs of the fishes when passing the mouth of Price Creek are yet too green to be spawned. This has been clearly demonstrated by our experience in former years, when our men captured hundreds in Eel River by means of seines; attempts were also made to hold fish in live-cars taken 25 miles farther up the river, but the results did not justify the expense.

During the season of 1910 a shipment of steelhead eggs, 200,000 in number, taken at the dam of the Snow Mountain Power Company on the South Fork of Eel River in Mendocino County about 100 miles inland, was made to this station via Ukiah, thence by rail to San Francisco, carried by steamer to Eureka, and again shipped by rail to Alton. These eggs arrived in good condition, all things considered. (Note report of Superintendent Fassett.)

By continuing the egg-collecting station on the Snow Mountain Power Company's dam, which possesses unusual advantages for taking a large number of steelhead eggs, we could add greatly to the output of the Eel River Hatchery. Another opportunity to contribute is presented by the fine station on Scott Creek, in Santa Cruz County, which is improving yearly. When the railway now building northward from Sherwood towards Eureka is completed, it will be comparatively an easy matter to ship in 1,000,000 eyed steelhead eggs from the Snow Mountain stations, which may also furnish a supply of salmon eggs.

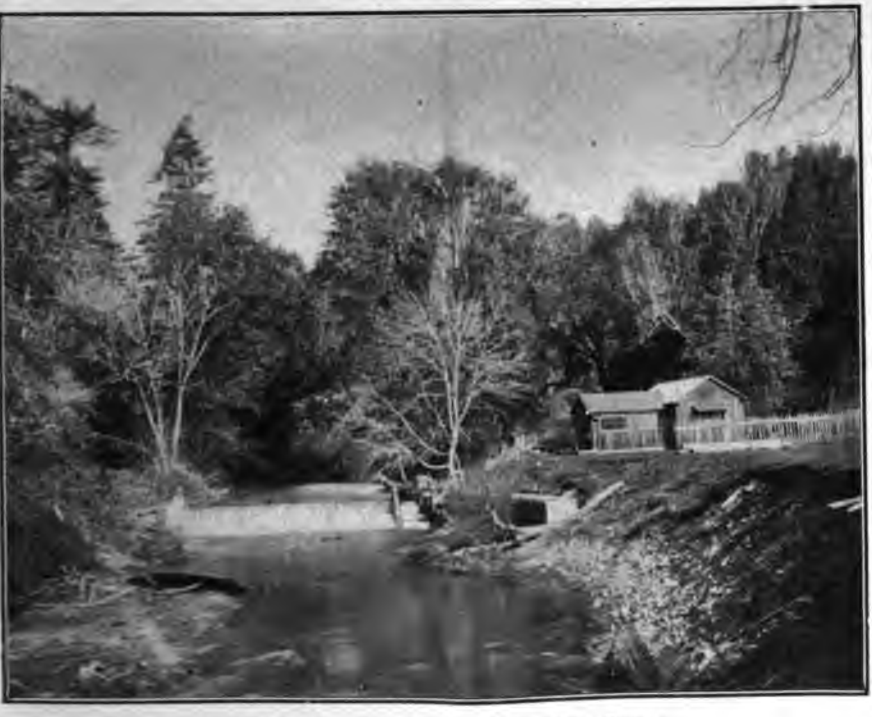
For these reasons we are heartily in favor of enlarging and improving the Eel River Hatchery.

Much credit is due the superintendent, Mr. W. O. Fassett, who with a small force has not only kept his station in an excellent state of repair, but made many improvements. He has also handled the important fish cultural work intrusted to him with marked success. His reports on both salmon and steelhead work for the past two years will be found in the Appendix.

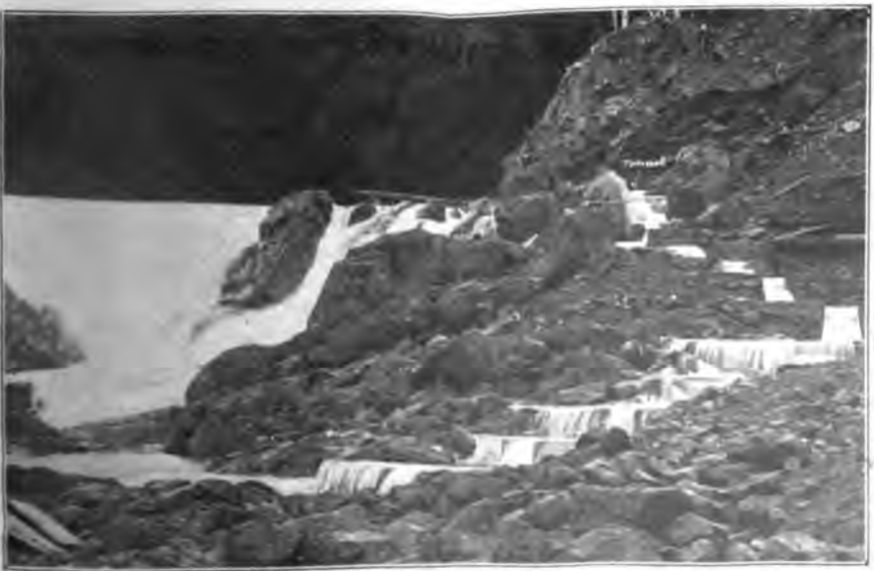
SCOTT CREEK STATION.

This important steelhead egg-collecting station is located on the creek of the same name in Santa Cruz County, at Swanton. It was first established by Mr. Frank A. Shebley, the efficient Superintendent of the Brookdale Hatchery. Scott Creek is one of several streams in the county where a considerable number of steelhead eggs can be collected at comparatively small expense. This one possessing some advantages over the others, Mr. Shebley, with the approval of the county board of supervisors, built a concrete dam across this creek, with a fishway and trap connected, through which the fish would be diverted into a retaining pond, in which they are held until ready for spawning.

Two years ago a request was made of this Board to assume a part of the expense of operating the Brookdale Hatchery, in return for which a sufficient number of eggs or fry were to be furnished for distribution into neighboring counties, San Mateo, Santa Clara, and Monterey. After due consideration of the matter, and investigating the possibilities, an agreement was entered into between this Board and the supervisors of Santa Cruz County, wherein such privileges on Scott Creek as had been acquired by the supervisors were made over to the State, which in turn should assume all expense of its operation and improvements. In order to avoid the expense of operating on several streams and yet collect all the steelhead eggs we would require, a five-year lease was made for a strip of land 200 feet in width, being 100 feet on each side of the middle line of creek where the stream passes through the land owned in common by A. Gianone, William Purdy, Kate Purdy, and Amy Arano, for a fixed consideration per year, depending upon the amount of the holdings. With the Ocean Shore Railway and the Shore Line Investment Company, who were the principal owners of the lands abutting the stream, a yearly lease was made through Mr. J. Downey Harvey, president of these companies and a former member of this Board. Notices were then posted closing the stream to all fishing for a distance of about six miles from its mouth. The concrete dam was enlarged and strengthened, a new trap put in position last year, and this year $500.00 was appropriated for additional improvement in the shape of a concrete retaining pond.



Scott Creek Spawning Station, Santa Cruz County.



Snow Mountain Power Company Dam and Fishery, South Fork of Eel River.

The collections for this season were 2,182,000 steelhead eggs, of which 320,000 were sent to Sisson, the fry from which are used to stock coastwise streams in Santa Barbara, San Luis Obispo, and Ventura counties; about 200,000 were sent to the Marin County Hatchery, and 100,000 shipped to the United States Bureau of Fisheries Station at Oregon City, Oregon; the remainder, except 200,000 hatched at Spawning Station and returned to Scott Creek, were hatched in the Brookdale Hatchery, which, together with the salmon eggs collected, made a grand total of 3,582,000 eggs of all kinds. Three fourths of the fry were distributed in the waters of Santa Cruz County; the balance were distributed between the counties of San Mateo, Santa Clara, and Monterey. The proportion of the total operating expenses borne by the State approximates two thirds, which is paid out of the fish and game preservation fund.

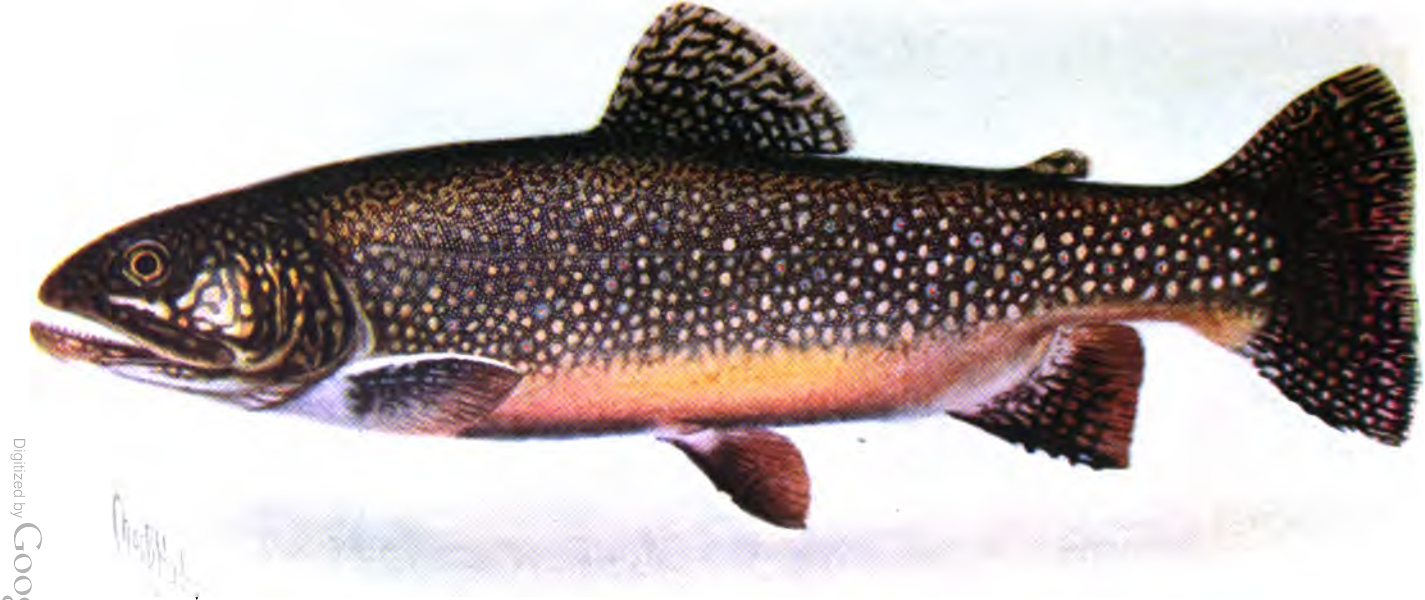
We beg to express our appreciation of the never-failing courtesy of the county board of supervisors, especially of Mr. Ralph S. Miller, who acted as a committee of one on matters pertaining to the hatchery; and in all matters pertaining to the advancement of the fish and game interests we have had the cordial coöperation of Mr. Miller.

Mr. Shebley has carried on successfully some very interesting work in the line of hybridization, and succeeded in establishing a cross between the female steelhead trout of the coast streams and the male Lake Tahoe trout—a fish that we believe will prove of inestimable value to the waters of Lake Tahoe, Independence, Webber, and Donner lakes, as this cross seems to produce a fish retaining all the fine food qualities of the trout of the mountain lakes, combined with the well known gamy qualities of the steelhead.

Some important scientific work has been carried on for the past two years by Dr. C. H. Gilbert of Stanford University in the interest of the United States Bureau of Fisheries, in which he was assisted by our Mr. C. A. Reed.

EASTERN BROOK TROUT.

As will be seen by comparison with the reports of 1900 only 6,000 fry of this variety were turned out by our hatcheries in that year. The output for the past three years has been in excess of one million per year. These fish have shown remarkable adaptability to small lakes and meadow streams of the high Sierras. In order to satisfy the demands we have made some plants in considerable numbers in Coast Range streams, but no appreciable results have been manifest; on the other hand, at all elevations above three thousand feet and up to eight and nine thousand splendid results have followed, which the people in the mountains are not slow to realize; consequently there is an increasing demand, and as new lines of transportation have enabled us to reach



EASTERN BROOK TROUT (Salvelinus fontinalis)

DRAWN FROM MALE FISH 13 INCHES LONG

heretofore inaccessible sections, we believe every effort should be put forth to meet it. This beautiful fish finds a congenial habitat in waters where neither the rainbow, cut-throat nor Loch Leven trout will remain. The cut-throat prefers the calm waters of a lake altogether, while the rainbow is essentially a fish of the swift-running streams of large volume. Both the Eastern brook and Loch Leven possess a decided advantage over our native fishes with reference to their breeding habits. They mature one year earlier, and are known as "fall spawners"; that is, they seek the spawning beds the latter part of October and November. That being a time when the summer tourists and stockmen have left the mountains, they can perform that function of nature unmolested, consequently we believe through natural propagation a larger percentage of eggs are fertilized and hatched than of the native fishes. During the past two years, in addition to renewing the plants made in previous years in sections where the fishing had been heavy, substantial plants have been put into barren waters beginning at a point as far south as the Giant Forest region in eastern Tulare County and extending northward to Siskiyou County.

Through an exchange for the eggs of cut-throat trout, we were able to procure 5,000 of these fish ranging from four to eight inches in length, from Messrs. Morrill and Denton, at Verdi, Nevada, of which number about one half were sent to our Sisson Hatchery to cross with our pond fish, with the view of bringing together unrelated stock and overcoming the effects of interbreeding. The remainder were planted in Donner Lake, a magnificent body of water, but with no well defined inlet that could afford a spawning ground for cut-throat or rainbow trout, but which has weedy shoals and sandy beaches suitable for the Eastern brook. We hope to make this one of the banner lakes of the Sierras for these fishes.

We have also been able to stock liberally suitable waters with both Eastern brook and Lock Leven trout in Inyo County, a region heretofore neglected through lack of transportation facilities. Our fish distributing car has made two trips in the past two years to that section of our State, carrying in a liberal supply of rainbow, Eastern brook, Lock Leven trout, and also substantial plants of black bass. We have found Inyo County has waters specially adapted to all these varieties, besides it is rich in game, and will undoubtedly soon be known as a "Sportsman's Paradise," which title it already deserves. The people generally are most appreciative of our efforts and have shown unbounded hospitality to our representatives. Public sentiment being so strongly developed in favor of fish and game preservation, we have sent in a liberal supply of pheasants and Hungarian partridges, that were distributed in different sections of the county and from which excellent reports have come, showing a substantial increase in the wild state, which indicates the adaptability of these rare game birds to that section. The fish and game interests of the county have been carefully and intelligently cared for by our deputy, Mr. E. H. Ober, and his efforts ably seconded by Sheriff Naylor, the board of supervisors of the county, and the Owens Valley Chamber of Commerce.

LARGE-MOUTH BLACK BASS.

Considerable space was devoted to the importance of these delicious food and game fish in our nineteenth biennial report. We quoted the opinion of some of the oldest fishermen on the Sacramento and San Joaquin rivers to the effect that in a few years these fish would be as plentiful as carp. While we anticipated a substantial increase, we hardly expected such wonderful results as have been accomplished.

We believe that California to-day is one of the best stocked states in the Union. The rivers, streams, and sloughs throughout the Sacramento and San Joaquin valleys are teeming with them. There is scarcely a suitable reservoir or lake below the range of trout in which a fine day's sport can not be had. Lakes and sloughs tributary to Owens River in Inyo County have received substantial plants during the past two years, and a gratifying increase has been noted. Their range in this State is practically unlimited, so far as a northern or southern latitude is concerned. Their introduction into Clear Lake, Lake County, a number of years ago has proven to be a decided success. While they could be seen in considerable schools it has only been in the past three or four years that a sufficient number could be caught to make the sport worth while. The explanation for this would seem to lie in the fact that there was such an abundance of food supply in the shape of small native fishes and young carp that the ordinary angler's lure would not attract them. In the past two years experienced anglers who have fished in nearly every state in the Union report to our office that the black bass fishing in Clear Lake exceeded anything in their experience.

As an exchange of international courtesy, a car load of these fish was captured in Fresno and Kings counties by Deputy A. D. Ferguson, assisted by Deputies Ellis and Smalley. These fish were taken in the latter part of December, 1909, and transported in our fish distributing car to two points in the Republic of Mexico. There were 1,800 adult fish in the shipment: three fourths of them were planted under the direction of Governor Ahumada, in Lake Chapala, a body of water 60 miles in length with an average width of 10 miles, in the State of Jalisco. The remainder were planted in a small lake designated by Governor Landa of the district of Mexico, near the city of Mexico. The first liberation of the fish did not occur until the tenth day after their capture, and yet so skillfully were the fish taken and handled en route there was a loss of but two fishes, and these lost their lives by jumping out of the cans while in transit.

This tender to the Mexican Government was made in exchange for the wild turkeys that we have procured from that country, and which are now flourishing at the State Game Farm. Every courtesy and extreme hospitality was shown to Mr. Requa, in charge of the car, and his four assistants by the Mexican officials.

Another long distance shipment of more than ordinary interest was made at the request of the United States Bureau of Fisheries at Washington, D. C., when 140 large-mouth black bass, ranging from 5 to 8 inches long, were sent to the Philippine Islands. The fish were taken with hook and line by Deputy M. L. Cross from the Daly reservoir near Folsom, Sacramento County, and delivered to Alvin Seale, representing the Washington authorities, on board the United States army transport *Sherman*. Careful preparation had been made, a circulating pump arranged to keep the fish supplied with fresh water at all stages of the long journey, and ice supplied when necessary. Thirty-four days were occupied in making the trip, during which time but 22 fish were lost; the remaining 118 were planted in good condition in a lake of considerable size, which in the judgment of Mr. Seale is well adapted to their requirements. Our State, in addition to furnishing out of its abundance a new and valuable fish to the Philippine Islands, has also given to New Zealand the quinnat salmon and rainbow trout.

During the past three years many black bass, also striped bass, have been rescued from overflowed islands in the San Joaquin delta and in the vicinity of Sacramento. In the San Joaquin district thousands of these fine food fishes were taken either by our own men or by trustworthy fishermen acting under written permission and returned to living waters. In return for the work which involved damage to nets and gear, as well as time, the fishermen were allowed to retain all striped bass weighing 3 pounds and upward, all under 3 pounds and all black bass being placed alive in waters connecting with the main river. The black bass taken around Sacramento were captured by Deputy George Neale, and enough retained to fill applications throughout the State, the remainder being placed in small lakes and other suitable bodies of water in Sacramento County. In the Fresno-Kings section of the San Joaquin Valley, where black bass were first planted in 1895 and 1897, they have shown remarkable increase. Some conception of the numbers to be found in that region may be formed when it is shown that this Commission, through its branch office at Fresno in 1909, took out and returned to living waters some half million live bass of all sizes, mostly small, which had been stranded or cut off from the main rivers by receding floodwaters. Experienced and careful observers report a remarkable decrease in the numbers of carp, proportionate with the increase of black bass, to which voracious fish the young carp fell easy prey.

Requests have been made by market fishermen and some of the dealers asking that the law be amended to permit of the capture of black bass with nets or seines. In our opinion such legislation would be most unwise. Black bass travel in schools, and it would be possible to wipe out the entire supply in any given body of water if such operations were made legal. Besides, so long as the present restrictions exist permitting them to be taken with hook and line only, a far larger number of our people, especially those living in the country, derive food, profit, and pleasure by capturing them in accordance with the existing law. We would, therefore, recommend that no change be made.

SHAD.

This valuable food fish continues to be found in great abundance throughout the Sacramento and San Joaquin basins, and the principal streams tributary to these rivers, also in Suisun, San Pablo, and San Francisco bays. No necessity has yet arisen for any restrictions as to their capture, except the one referring to size of mesh with which they can be lawfully taken. This restriction, however, was not intended to apply to shad, except in a limited degree, but is intended for the protection of the striped bass and salmon. Without it, market fishermen could with perfect impunity operate during the close season on the plea that they were trying to catch shad, and accidentally caught salmon or striped bass during the prohibited time or with unlawful seines. This in itself would not be serious were it not that the average market fisherman never releases anything that comes into his net, and would take a chance upon finding some way to smuggle it into the market. It is a remarkable fact that while the shad is considered the most valuable river fish of the Eastern States, our people have yet failed to appreciate its good qualities. There is no question as to the quality of the fish, which when properly handled is equal to the best taken anywhere in the world. The principal cause for complaint is because "it is so bony." During the past two years we have seen large catches aggregating 800 pounds made by two fishermen on a single drift, which contained specimens weighing ten pounds, but owing chiefly to the limited demand the price paid to the fishermen ranged only from one half a cent for males to two and one half cents per pound for the females, the additional price being added for the "shad roe." In our nineteenth biennial report we suggested that in order to create a better market for shad, the exportation of striped bass from the State be prohibited. Such a law, we believe, would result in exporting thousands of pounds of shad into Nevada, Utah, Colorado, and Arizona, that are now taking our striped bass, and tend to reduce the constantly rising price paid by our own people in this State. We again earnestly recommend that this matter be brought to the attention of the legislature at the forthcoming session.

A brief history of the shad, we believe, is worthy of repetition. The first plant aggregating 50,000 fry was brought from the state of New York from the state hatching works on the Hudson River at Castleton by Seth Green, recognized as one of the pioneer fish culturists of this country. They were planted in the Sacramento River at Tehama on June 27, 1871, which was followed by other plants in 1873, and the last one in 1881. A bonus of $50.00 was offered for the first shad to be taken in the waters of our State, and that was paid in 1873. In 1874 sixteen full grown fish were taken at Vallejo. Since that time they have become so firmly established and are in such abundance that we believe that the declining shad industry of the Eastern States can be renewed and replenished by obtaining a supply of shad eggs or fry from California.

CATFISH.

The catfish is another important food fish that has shown remarkable development in this State. The first plants introduced here came from the Schuylkill River, Pa., and from the Missouri River at Omaha, Nebr. This gave us two varieties of catfish. Both were planted in the San Joaquin River near Lathrop. They have been transplanted into other sections of the State until there is scarcely a stream or slough in the Sacramento or San Joaquin valley that does not contain them in great abundance. The sale for them, however, in the San Francisco markets is somewhat limited, and they are purchased principally by the Chinese. On account of their excellent food and shipping qualities, tons of them are sent out of the State every week, principally from Sacramento, from which point they are shipped south to Arizona, northward to Oregon, and eastward as far as Kansas City. Previous to the last session of the legislature there had been no restrictions upon their capture, but owing to the increasing markets outside of California and the excellent price this drain was greater than the natural increase would warrant, and the fishermen began to take the smaller ones by reducing the size of the mesh of their fyke nets, by which they are principally caught. At the request of the principal fish dealers of Sacramento, a recommendation was made that the minimum size at which catfish could be sold was eight inches, applying to dressed catfish. This became the law, and with a slight amendment in its phraseology will, in our opinion, be all the restrictions required. Market fishermen operating around Bouldin Island in the San Joaquin River claim that through the workings of this law it has reduced the sales from one half to three fourths, but while this law creates a temporary hardship among those who follow that mode of fishing for a living, it will in a couple of years, in our opinion, regulate itself.

STURGEON.

For about ten years an absolutely close season has existed against the taking or possession of fresh sturgeon. This law was passed with the hope that these fish would show an increase. The results have not been encouraging. Various theories are advanced, the principal one being that in the waters in which sturgeon were once in great abundance, striped bass and black bass—two types of voracious fishes—are now found, and it is believed they feed largely upon young sturgeon or sturgeon eggs. In certain sections of the Sacramento and San Joaquin rivers large specimens are still found. They are a menace to the fishermen's nets, frequently becoming entangled in them and creating considerable havoc, with the result that every sturgeon caught in a net was killed, and the bodies of these large fish were found along the rivers. In order to prevent this needless waste of a very excellent food supply, a law was enacted at the thirty-eighth session of the legislature making it an offense to kill or have in possession any sturgeon weighing less than 25 pounds. Fish under that size can pass through the salmon nets and need not be taken or destroyed. It gave an opportunity, however, for the fishermen to capture and sell any sturgeon weighing 25 pounds or more. As specimens weighing over 100 pounds are frequently taken, we believe that some good is being served and no real injury inflicted upon the sturgeon supply of this State.

ABALONES.

During the past three legislative sessions various changes have been made with respect to the taking and possession of abalones and abalone shells, referring also to size and method of capture. The existing law prohibits the taking of the black and green abalone of any size at any time, but permits the abalone known to commerce as the red abalone (*Haliotis rufescens*) measuring not less than seventeen inches around the outer edge of the shell to be taken at any time. The red abalone has a distinct food value, the broth being especially valuable in the sick room. Under this law one or more abalone canneries are operated, and the product is sold largely throughout the United States. On the other hand, the shell of this variety has but little commercial value, whereas the shell of the black and green abalone has a very considerable value, being used in the manufacture of abalone jewelry, for which there is a large and constantly increasing demand. When this law went into effect there was in the possession of dealers and manufacturers a large stock of black and green abalones that had been legally taken and was not worked up. Under a liberal construction of the law, jewelers and other manufacturing establishments were permitted to work up the old stock, which is now practically exhausted. Unless some amendment is made to the present law it will result in putting out of business a number of manufacturing establishments employing white labor in this State.

The real purpose of the law was aimed at the aliens, Japanese and Chinese principally, who were taking them by the ton without regard to size by the aid of diving suits, removing the meat from the shell in the water, bringing it ashore, where it was dried and shipped either to China or Japan. We believe the use of diving suits should be permitted, as there are apparently inexhaustible beds of red abalones along our southern coast, which can not be profitably taken in any other way, and the law should be amended so that both black and green abalones can be taken and possessed at any time, the former not to measure less than twelve and the latter less than seventeen inches around the outer edge of the shell, but prohibiting absolutely the shipping of dried abalones or unmanufactured shells out of the State. Such a law would not only permit the canneries to operate, put up their catch and dispose of it, but would furnish a sufficient stock of shells of all kinds for use of local manufacturing establishments, whose combined demands would not be one twentieth part of that made in shipping dried abalones and shells out of the State. Legislation along these lines would be fair, just, and, we believe, produce the desired effect.

CRAWFISH, OR SPINY LOBSTER.

In our nineteenth biennial report and again in our preliminary report of 1907–08 we recommended that a close season of two years be established on this, one of our most important shellfish, which began to show signs of possible extermination. The matter was presented to the legislature, and after much discussion a law was enacted establishing an indefinite close season, but permitting crawfish measuring not less than nine and a half inches, but taken without the waters of this State, to be sold in our markets under restrictions which were to be prescribed by the Board of Fish Commissioners, and provided further that the expense of such inspection and marking "shall be borne by the person or persons importing such lobster, or crawfish." It was represented to the legislature that crawfish were to be found in great abundance in Mexican waters, and a company had been organized to propagate them extensively on the coast of Lower California. This law has worked satisfactorily. The only port of entry for Mexican crawfish is San Diego, where a representative of the Fish Commissioners meets every incoming shipment, and checks up and marks each individual specimen. This plies the markets of Los Angeles and other southern cities and permits a considerable number to be sold in San Francisco. We believe this law should remain in force at least two years longer, by which time there should be a sufficient increase to permit of their being again taken under certain restrictions yet to be determined upon in our waters.

CRABS.

In our preliminary report submitted during the thirty-eighth session of the legislature we recommended a change in the law relating to the seasons for taking of crabs, opening the months of September and October, and establishing in lieu thereof a close season of four months extending from the first of November to the first of March of the following year, which recommendation was favorably considered by the legislature and enacted into a law. While this law has some advantage over the other, we are firmly of the opinion that sufficient protection is not yet accorded to this, one of the most delicious crustaceans to be found in any part of the world. We find that through extensive fishing the large crabs have been practically exterminated on the principal fishing grounds, and believe that the surest way to restore the supply would be by establishing a close season of two years. In point of numbers the supply does not seem less, but three fourths of the crabs found in the markets do not average over six or seven inches across the back, and it requires at least three to furnish the same amount of crab meat as is produced from an eight or nine-inch crab. An absolute prohibition against their catching for a term of two years would enable small crabs to attain a respectable growth. If it is not deemed advisable to establish a close season for that length of time, we would urge that their capture be prohibited for at least six months of every year, beginning with the first of October and ending on the first of April, and at the same time raising the minimum size from six inches to not less than seven and a half. This would, however, have the effect of making the price of crabs almost prohibitive, which in turn would be an inducement for the alien fishermen to smuggle in the smaller ones and dispose of only the "crab meat." Such a law would be difficult of enforcement, as it would be almost impossible to get conclusive evidence as to size or sex, and would also encourage the capture of the female crab. The better way in our opinion to bring about the desired result, with fairness to all, would be in the establishment of a two years' close season.

THE SHRIMP LAW.

To take shrimp without taking and destroying an unreasonable number of small fish continues a difficult problem, as shown by the list of arrests and fines. The Chinese fishermen have been fined for violations of the shrimp law during the past two years the sum of $4,325.00, this being the largest amount for violation of any section of the Penal

Code relating either to fish or game; notwithstanding which their harmful methods of taking shrimp show little or no improvement. At the last session of the legislature a close season of three months—June, July, and August—was established, with the hope that this interruption in the work would close up the camps and cause the experienced crews to leave for other employment, so that when the season opened again there would be difficulty in getting trained hands.

We had confidently believed that the law prohibiting the exportation of dried shrimp and shrimp shells out of the State would be a restriction sufficient to put out of business practically all of the boats, except those engaged in the capture of shrimps for consumption in the fresh state, and that number of boats, 5 or 6, could not affect seriously either the supply of shrimps or young fish and could easily furnish all the fresh shrimp that can be consumed in this State. After observing carefully the workings of the present law, we are convinced that a better and more positive way to stop this drain on the fish resources of San Francisco Bay can be accomplished either by establishing an indefinitely close season, or by making it an offense for any person to take or have in his possession more than 5 pounds of dried shrimp or shrimp shells taken in the waters of this State. In our opinion, the latter suggestion would be perfectly feasible and produce the desired relief, even to the point of permitting their capture the entire year.

There is no scarcity of shrimp in our waters. They are in great demand by hotels, restaurants, and for private consumption. To limit the possession of dried shrimp to 5 pounds would at once put an end to the extensive drying operations whereby tons of shrimp are handled daily, and which are intended primarily for export. In spite of the fact that tons of Mexican shrimp or prawns are cleared through our office under permit, we find that California shrimp and shrimp shells have been sent to China and other countries labeled "dried fish," "seaweed," "fertilizer," "coffee," or "beans," and not shipped in sacks, but in tightly nailed boxes or barrels.

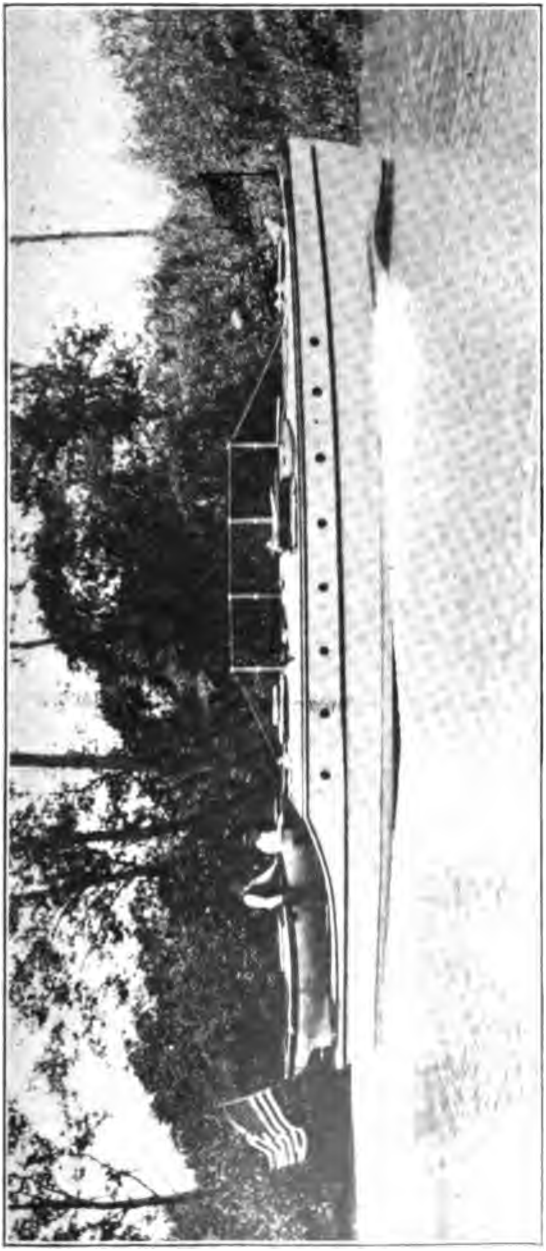
Important seizures have been made, and in some cases substantial fines imposed, but not, in our opinion, commensurate with the gravity of the offense, the result being that the exportation continues in one form or another, indicating there is much profit in the shrimp business, which is carried on exclusively by the Chinese. The dried shrimp are not used by whites, and only a small fraction of the total amount produced is sufficient to meet the demands of the Chinese and Japanese residing in this State. Therefore, our citizens would not be at all disturbed should the drying of shrimp be prohibited altogether and fresh shrimp permitted to be handled as at present.

Undoubtedly some small fish will be taken so long as the use of bag nets is permitted. Should the law be amended prohibiting their use for the taking of shrimp as well as of fish, it would result in finding some other and less destructive method of effecting their capture. This would indicate that it may not be a necessity to prohibit the catching of shrimp. We are, therefore, of the opinion that if the possession of more than 5 pounds of either dried shrimp or shrimp shells be made an offense punishable by a fine of not less than $100.00, trial jurisdiction to be in the Superior Court, the damage to the fishing interests of our bays will be reduced to the minimum without depriving the markets and the people generally of a choice crustacean, which is peculiarly a California delicacy. The suggested changes will be met by strong opposition, as the Chinese are always represented at the legislature by agents or paid attorneys.

NEW PATROL BOAT.

The patrol boat Quinnat, which had been in service for fourteen years, has been replaced by a larger, faster boat of more modern type. The old boat which was 40 feet over all, 7½ feet beam, and equipped was a 22 horsepower "heavy duty" engine, had a draft of 4 feet, which frequently proved a disadvantage when in pursuit of violators, who could escape by running into shallow water with their boats of light draft. The Quinnat had rendered excellent service and was unquestionably for years the best gasoline boat to be found in these waters, with sufficient speed to overhaul any of the fishing boats, but few of which were power boats. At the present time about 30 per cent of them are equipped with gasoline engines.

The method of collecting and shipping the catch of commercial fishes has also materially changed. Formerly the fishermen operating in the rivers delivered their fish at some steamboat landing from where it found its way to the markets through regular transportation channels. To-day all the large fish dealers have fast power boats in which their agents hover around the fishing grounds and buy the fish direct from the fishermen as soon as they are taken from the nets. When a load has been obtained, these boats come directly to San Francisco. It therefore was a necessity to have a boat fast enough to overhaul any other boat in the fishing business. We gave careful consideration to the question of installing a more powerful engine in the old hull, but as that would increase the already excessive draft, and believing that the model could be improved, it was decided to build an entirely new boat on different lines with more speed. In the past few years there has been developed what is known as the cruiser of the raised-deck type, a boat capable of going to sea in almost any weather, and is the successful type used for long trips on the Atlantic between New York and Bermuda Islands, a distance of about 600 miles. From the originators of this model, Whittlesey & Whittlesey, marine architects of New York, we procured the plans and specifications, which were submitted to four well known boat-builders of San Francisco and vicinity—John Twigg & Sons, W. S. Brusstar & Sons, H. Anderson, and Wm. Cryer. Twigg & Sons being the lowest bidders, the contract was awarded to them for the construction of a hull to be 46 feet in length, with a beam of 8 feet 9 inches,



New Patrol Boat "Quinnat."

draft 38 inches, which was 10 inches less than the old boat. Four sleeping berths, a complete galley, a 12-foot tender, and a lavatory were also included in the contract. Later the tender was equipped with a 2 horsepower gasoline engine. The name Quinnat was transferred to the new boat, which was successfully launched on June 5th, and went into commission shortly thereafter. Under favorable conditions the boat will develop a speed of 13 miles per hour, which is furnished by a 40 horsepower engine. The construction of the boat is solid and substantial in all particulars. The interior trimmings are of Philippine mahogany, a wood which is particularly adapted to this climate. It is equipped with electric lights throughout, and carries also a powerful searchlight, which is of great advantage for night work. An entirely new and successful feature of the boat is its controlling device, the invention of a San Francisco concern—Binns & Pagendarm—which enables one man from the cockpit to have complete control of the steering apparatus, the engine, and the searchlight.

Special provision was made for three large fuel tanks, which were located under seats in the cockpit, and carry 240 gallons of gasoline. This gives her a wide cruising radius, and will permit trips being made as far as Monterey Bay, and also to watch the crab fishermen and larger fishing boats which operate outside the heads in the Pacific Ocean The total cost of the boat and its equipment was $6,500.00, which was met by the sale of commercial fisherman's licenses.

We have also acquired by purchase a fast light draft boat, 25 feet in length, equipped with a 12 horsepower engine, for use in the shallow sloughs around Sacramento to look after market hunters and fishermen. This boat is in charge of Deputy George Neale, with headquarters at Sacramento, from which point it operates northward and to points down the river as far as Rio Vista, paying special attention to the striped bass and black bass breeding grounds, which are embraced in Cache Slough and its tributaries, Lindsey, Prospect, and Miner sloughs. We have also procured from the Gorham Engineering Company of Alameda, in exchange for the old Quinnat, an entirely new 26-foot power launch built on the salmon boat pattern, which can operate in all kinds of weather and has proven to be a valuable auxiliary. Resembling so closely the regular fishing boats, she is able to do not only considerable detective work around the shrimp camps without being observed, but among the market fishermen. She can also be used to good advantage in the shallow sloughs tributary to the San Joaquin River, in the vicinity of Stockton, where shad, black bass, striped bass, and catfish are found in large numbers, and will prove a valuable adjunct to the striped bass hatchery work. These boats, with their complete equipment, have been paid for out of our own funds without asking for a dollar of appropriation.

NEW FOOD AND GAME FISHES.

Through the courtesy of Hon. Geo. M. Bowers, Commissioner of the United States Bureau of Fisheries, there was received in the month of November, 1908, a car load of fresh water fishes adapted to the smaller bodies of water at low elevations.

The car was loaded at the United States Fishery station at Meredosia, Ill., with the crappie (*Pomoxis annularis*), the blue-gilled sunfish (*Bepomis pallidus*) and the yellow perch, commonly known as ring perch (*Perca flaverscens*).

The crappie is one of the most popular of the fresh water fishes found in the markets of Washington, St. Louis, Chicago, and Baltimore. It does not range far north, but is held in high esteem in the Southern States, where it is a great favorite among the anglers. It will take a minnow bait as promptly as will a black bass, but does not make so much of a fight, although it requires considerable skill on the part of an angler to "land him." He is a most excellent pan fish, sometimes reaches the length of about a foot, a prolific breeder, and it is believed will find a congenial habitat in the small lakes and ponds at low elevations in this State. It is frequently called "calico bass," and there is but little difference between them, except that the calico bass is found in more northerly waters.

The blue-gilled sunfish is the best known and most important of all true sunfishes. It is commonly called "bream," and is found in the Great Lakes and throughout the Mississippi Valley. Though sometimes found in quiet streams, it is the sunfish of the lakes. It reaches a length of from twelve to fourteen inches, and maximum weight of a pound and a half. As a pan fish it is excelled only by the yellow perch, the flesh being firm and of a delicious flavor. It is an excellent fish for the angler, and can be taken with almost any kind of bait, or by trolling.

Of the perch family, the yellow perch is most highly esteemed for its fine food qualities. It is not a great fighter for the angler, although it bites well. Its usual length is twelve to fourteen inches, ranging in weight from a half to two pounds, but examples weighing 4½ pounds have been taken. He is essentially a lake fish, but flourishes in large, fresh water sloughs and deep lagoons.

It was believed by the Fish Commissioners that more attention should be given to stocking the smaller reservoirs and ponds and lakes at low altitudes with a pan fish that would afford not only some sport in its capture, but also furnish a food supply.

The fish reached us in good condition, and we had experienced deputies stationed at the different points where the fish were to be delivered so as to insure that they would be handled and planted by competent men.

The first shipment was delivered to E. W. Hunt, at Reno, who carried four cans of the crappie and sunfish to Honey Lake, in Lassen County.

The next shipment, yellow perch and crappie, was planted in Vera Lake, Nevada County, by Deputy Roy Sullaway.

Deputies Geo. Neale and M. L. Cross received allotments of bream, sunfish and yellow perch at Sacramento, which were planted in Plumas Lake, Placer County, and in sloughs of Feather River, near Marysville; also Washington Lake and Brushy Lake, in Sacramento County.

Deputy Roy B. Heacock landed a shipment of the three varieties in suitable waters around Stockton.

Deputy Ernest Schaeffle and Frank McCrea took a large shipment (ten cans) representing all three varieties, and planted them successfully in Clear Lake, Lake County.

Deputy Andy D. Ferguson at Fresno received and planted yellow perch and sunfish in Kings River, Lower Kings, and San Joaquin rivers.

Deputy A. C. Tibbet at Bakersfield received a shipment of sunfish and yellow perch, which were planted in the lower reaches of Kern River and Buena Vista Lake. Other shipments were planted in a small lake near Tehachapi, Kern County, in Russells Lake, Ventura County, and the remainder of the shipment was received by eight other applicants at points in Los Angeles, Riverside, and Orange counties.

The superintendent of fish distribution, Mr. R. W. Requa, joined the Federal car at Truckee and superintended the distribution and allotment of the fish to the various applicants.

It is yet too early to expect definite results, but some specimens of young bream and the blue-gilled sunfish have been received at our office, which were taken in waters of the Sacramento Valley, indicating that they are increasing.

TRANSPLANTING ADULT TROUT IN THE SOUTHERN SIERRAS.

During the past two years special attention has been given to stocking barren lakes and streams on both sides of the higher Sierras in Inyo, Tulare, Kern, and Fresno counties with adult fishes—golden, Kern River rainbow, and Loch Leven trout. The two last named varieties were taken from waters that had been stocked some years before with fry raised at our Sisson Hatchery and which had been transported as far inland as it could be done with safety. The golden and Kern River trout were taken from streams where they are abundant and placed in other waters barren of fish life in the same general locality.

The sum of $1,250.00 was appropriated for the work, which enabled us to equip two pack trains with specially built cans and other necessary apparatus. Deputy E. H. Ober, assisted by Sheriff Naylor of Inyo County, had charge of the work on the eastern slope, and in the face of many difficulties successfully transferred a large number of golden trout into waters heretofore barren of fish life, but rich in fish food.

District Deputy A. D. Ferguson of Fresno, assisted by Deputy S. L. N. Ellis, directed the pack train work in 1909 and 1910 in the Kern River, Kings, and Kaweah basins on the western slope. Adult golden trout were captured in very satisfactory numbers and successfully transported and planted into Crabtree Fork of Big Kern, North Fork of Kaweah River, and Whitney Creek. Adult rainbow trout were planted in four tributaries of Sugar Loaf Creek and other tributaries to Kings River in 1909. In 1910 Huckleberry Ellen and Spotted Faun lakes, in Tuolumne County, received 1,400 adult rainbow trout. Adult Loch Leven trout were placed in Rock Creek; Loch Leven fry in 18 cans distributed by pack trains in Pitman, Coyote, Red Mountain Bear, Shaver, and seven Dinkey lakes.

Adult rainbow trout were taken and distributed in considerable numbers into South Fork of the San Joaquin above Jackass Falls and four other headwater tributaries of the same stream. Sixteen tributaries of the Kings River, including lakes and streams in Granite Basin, received liberal plants of adult fish. All are ideal trout waters, but heretofore barren of fish life. It is confidently believed that this vast region will in a few years become a fisherman's paradise.

Much credit is due to the officers and members of the Sierra Club, who, under the skillful directions of Secretary Wm. E. Colby, have at their own expense, but under the authorization of this Board, successfully transplanted during the past two years more than 400 adult golden trout in the vicinity of Mount Whitney.

In July and August, 1910, more than 1,800 large golden trout of the two varieties were taken with hook and line by our deputies and distributed among 23 lakes and streams in which no fish have heretofore existed. In suitable places—meadow streams—seines were used to take the fish, but by far the larger number were taken with hook and line.

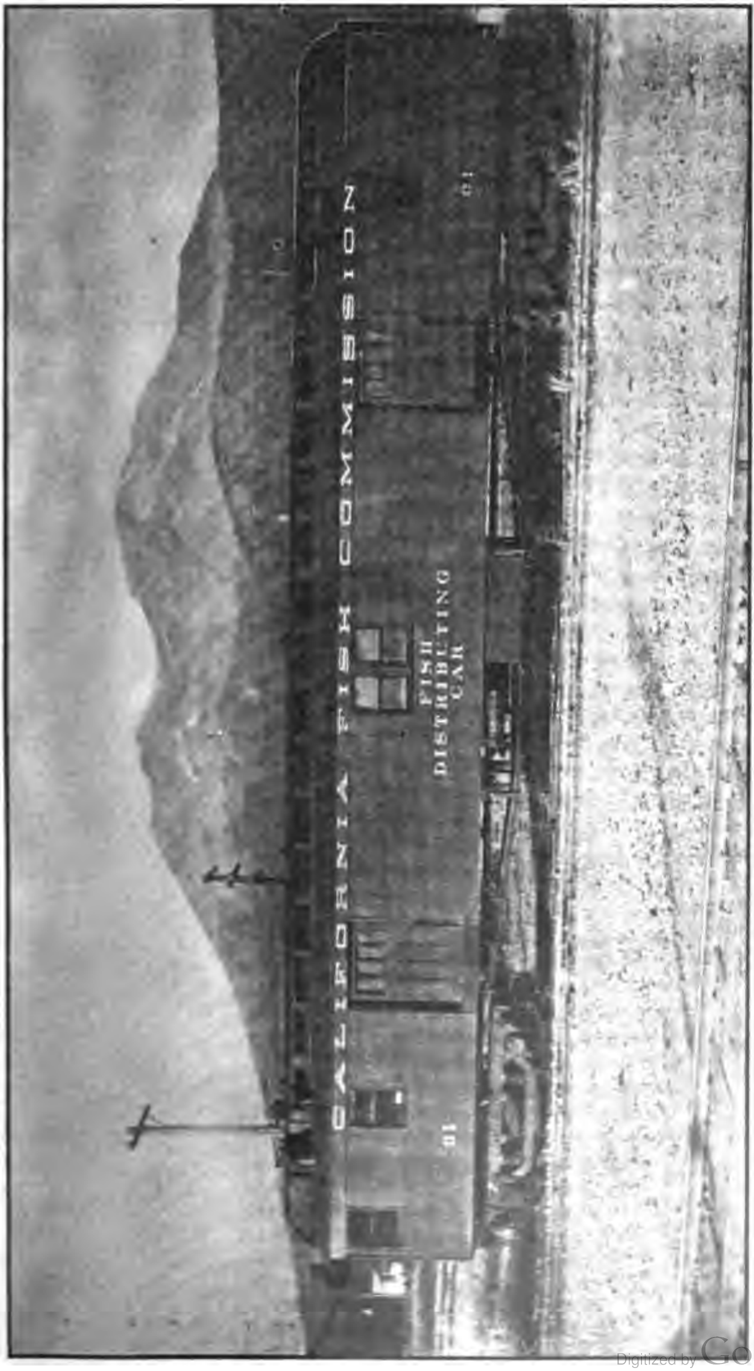
Some idea of the arduous character of the work is shown by the plants made in Deadman's Canyon, which occupied six days of pack-horse travel over a very rough country. The fish were true type, *Salmo roosevelti*, taken with seine at Whitney Meadows and planted with the remarkably low loss percentage of six fish out of 183. all adults.

THE FISH DISTRIBUTING CAR.

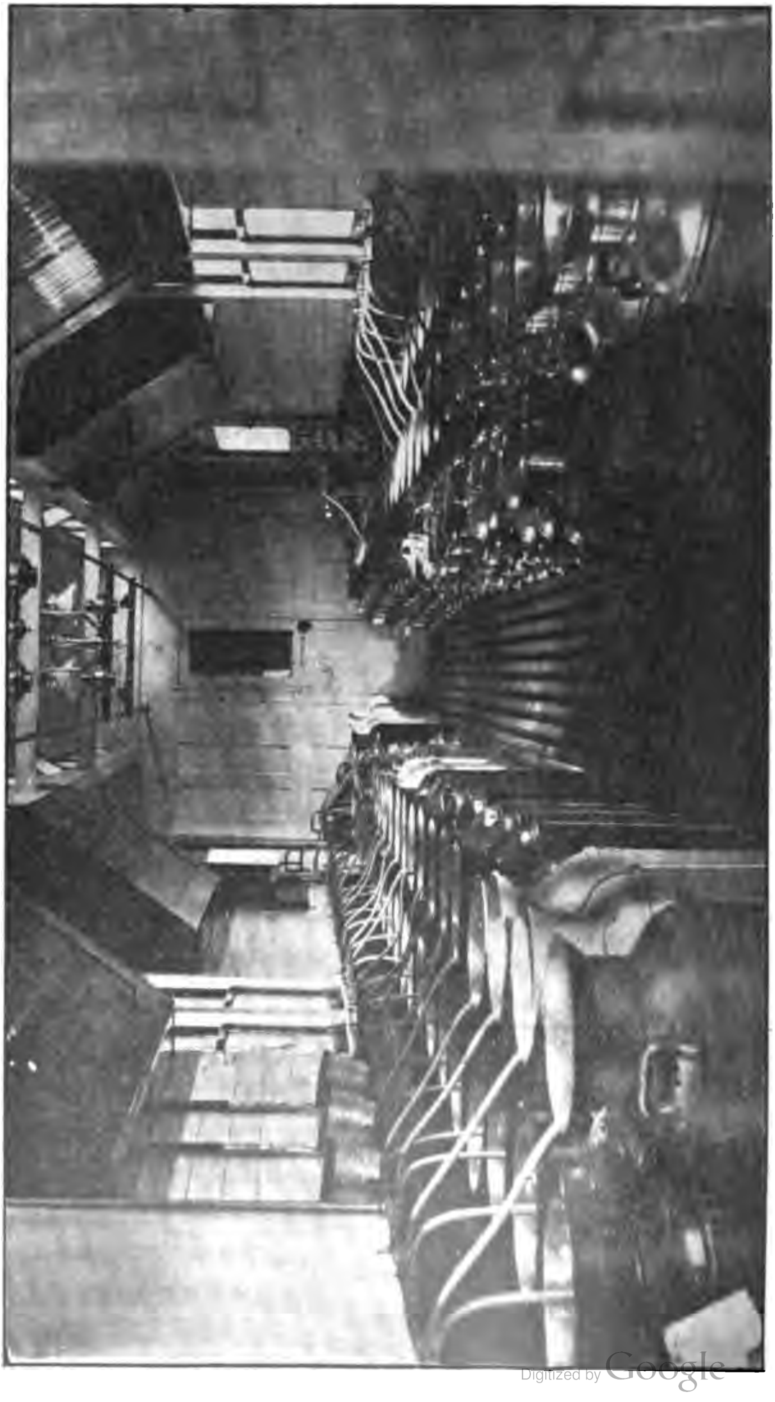
During the thirty-seventh legislative session an appropriation of $7,500.00 was secured for the purpose of acquiring and equipping a car to be used to distribute the fish raised in our hatcheries. At our principal hatchery, located at Sisson, the output was practically limited to the number of cans of fish that could be shipped between July 1st and November 15th of each year in the limited space that could be found in the crowded baggage or express cars, and which rarely accommodated twelve cans. On the long trips to southern California, occupying two nights and one day, the services of two men were required to handle twelve cans of fish and a week's time was occupied in making a round trip. Realizing that with better facilities to handle them not only could the output be increased and the fry reach the waters to be stocked in better condition, but the expense of distribution would be considerably reduced. The Chief Deputy, Mr. Chas. A. Vogelsang, being called to Washington to attend a meeting of the National Breeders' Association, was directed to inspect the fish distributing cars of the United States Bureau of Fisheries, of which there are six, with a view of getting the best ideas to incorporate in the new car under consideration, and the same was accordingly done. Through the courtesy of Mr. E. E. Calvin, general manager of the Southern Pacific Railroad Company, we were enabled to purchase for the sum of $4,500.00 a 60-foot substantially constructed baggage car. This car was then placed in the general car shops of the Southern Pacific Company at Sacramento, where under the personal supervision of master mechanic Heintzleman it received a complete and modern outfitting, including new trucks with steel wheels, air brake equipment, suitable lights, appropriate lettering and painting.

The interior was fitted up with four sleeping berths, following the plan of upper berths in Pullman cars, complete galley with six-hole range, tableware and table to accommodate the crew of four men. One end of the car was partitioned off and fitted up as an office for the superintendent of the car. The car also contained two steel tanks with a capacity of 500 gallons each, in which fresh water is carried as a reserve to replenish the supply in the cans carrying the fish should occasion arise. At the other end is located the engine room, in which is installed a steam boiler, two Westinghouse air pumps, a refrigerator, and the culinary department.

Under regular service conditions but one air pump is run at a time, but they are used alternately. The pumps compress air into an auxiliary tank or reservoir at a pressure of 80 pounds to the square inch, from which by using a reducing valve it is supplied to the cans containing the fish at 15 pounds. Before reaching them the air passes



Fish Distributing Car.



Interior of Fish Distributing Car.

through a system of coils placed in the bottom of the refrigerator, which chills it sufficiently to obviate the use of ice in the cans, where a temperature ranging between 48 and 50 degrees is constantly maintained. This plan also effects a saving in our ice bill over the former method of about 60 per cent.

The former crude method of aerating by hand every ten to twelve minutes, which meant lifting a half gallon dipper of water several feet above the can and pouring it back, has been abandoned.

Such treatment was hard on young, delicate fry, as through that operation many of them were injured or killed by being brought sharply in contact with the blocks of ice necessary in each can to maintain the water at a proper temperature. By the present method this danger is entirely overcome, as ice is not required until the cans leave the car.

Instead of having two men take between them twelve cans containing approximately 50,000 fish, the car with four men will easily carry ten times as many, or 500,000 fish, on a single trip. It has enabled us to treble the output from Sisson with very slight additional expense to the State.

Another important feature not to be overlooked is that by the aid of this car, which is really a traveling hatchery, we are enabled to concentrate our experienced force where best results can be obtained at small cost compared to the establishment and maintenance of other trout hatcheries where ice in quantity is not available, and transportation and distribution facilities totally inadequate. The car has fully met our expectations in all respects. The fish are being delivered in fine condition with practically no loss to any section of the State.

We are pleased to report that notwithstanding the stringent terms of the Wright railroad commissioners' bill, a liberal construction of the law was given by the Railroad Commissioners and the Attorney General, resulting in the different railway companies hauling our car and its crew free of charge.

During all stages of its construction our Mr. R. W. Requa was in attendance, and since going into commission, he has had full charge of the car, its crew and equipment, and we believe that to his energy and intelligence is due most of the credit for the success of the first fish distributing car in the West.

STATE GAME FARM.

As the hunting license law produced ample funds, and believing that the establishment of a State Game Farm where game birds could be raised in captivity and operated along the same lines as fish hatcheries, would be in entire accord with the spirit of the law, which authorizes expenditures for the propagation and restoration of game, and being encouraged by the example of other states, it was decided to undertake the establishment of one in California. Negotiations for services were entered into with several men who had had experience on game farms in Eastern States, also with Mr. J. R. Argabrite, a resident of California, who was a successful raiser of pheasants in Ventura County. This resulted in engaging the services of Mr. Argabrite in September, 1908. He was immediately detailed to examine and report on a number of different locations that had been offered for the establishment of such an institution. The choice finally fell upon some 45 acres located one mile west of Hayward, in Alameda County, owned by Mrs. H. G. Bedford. A lease was executed for one year, with a privilege of nine years additional, at the rate of $450.00 per year. Possession of the premises was assumed in November, 1908. An artesian well, which furnishes an abundance of water, was bored, and the construction of a barn, pens, brooders, and other necessary equipment was immediately begun. A contract was let for the building of a cottage for the superintendent. A stock of pheasants to be used for breeding purposes was purchased through Wenz & Mackensen, of Yardley, Pennsylvania, importers of choice European wild stock. Some were brought in from Oregon and others purchased from breeders in our own State. We also added to

State Game Farm—Male Hungarian Partridge.

the stock by withholding from distribution four dozen Hungarian partridges out of some 1,500 that had been purchased for distribution throughout the State. Owing to the fact that many of our imported pheasants did not arrive until the beginning of the breeding season, we collected comparatively few eggs the first year. The birds that were bought in our own State and Oregon were the first to arrive and were in prime condition at the breeding period. We raised approximately 1,200 young pheasants the first season, of which number about 800 were distributed in sections that in our opinion were specially adapted for their increase under wild conditions—Siskiyou, Humboldt, and Inyo counties receiving the largest number, ranging from 75 to 80 birds in each plant. Smaller shipments were made to other portions of the State and some given to private individuals who were properly equipped, and others liberated where conditions were favorable both as to environment and protection. In all, twenty counties received pheasants from the Game Farm the first year. A serious loss was sustained in October, 1909, through an act of vandalism—the pens being maliciously opened during the night, and many pheasants and valley quail were given their liberty. We were holding at the Game Farm for distribution at the end of the open season a large number of valley quail that had been trapped in remote sections where they are superabundant, and were to be used to restock public lands where through excessive shooting and interbreeding the supply of valley quail was

View of State Game Farm.

greatly reduced. Fortunately our superintendent was able to recover about three fourths of the pheasants, but the valley quail to the extent of 30 dozen were a total loss as far as the Game Farm was concerned. This outrage was followed within a few days by another more serious, when poisoned wheat was scattered in some of the pens that had not been opened, which killed a great many birds of all kinds. We estimated our total loss through escapes and poison at approximately 300 pheasants, 600 valley quail, and a few Hungarian partridges. A substantial reward was offered for information that would lead to the detection of the guilty party or parties. The matter was also placed in the hands of a well known detective agency, but sufficient evidence was not produced to justify taking the matter into the courts.

We retained from the previous year's hatch about 100 young birds for the season of 1910, and reared about 2,500 young birds until they were about six weeks old, at which time we met with another serious loss through a plague of rats that seemed to concentrate their efforts on the Game Farm, and cost us many young birds.

The improvements at the Game Farm are all of a substantial character, and were built with a view of meeting with requirements for a period of ten years. The total cost, including the original cost of birds, barn, residence, pumping plant, boring of a well, brooders and pens, is approximately $10,000. The working force has never exceeded three men, part of the time but two. We have through the sale of eggs and domestic poultry received returns in the shape of Game Farm earnings up to June 30, 1910, of $938.32, which is more than double the amount of the annual rental of the premises.

Our farm was recently visited by Dr. T. S. Palmer of Washington, D. C., in charge of game preservation in the United States. He pronounces it one of the best game farms that has come under his observation and one which he believes has a great future. The propagation in captivity of both game birds and animals is strongly encouraged by the Federal Department having charge of game preservation. It is believed to be the surest way to preserve and increase the wild game, and will furnish to those who do not hunt an opportunity to satisfy their tastes for wild game by purchasing it, either in the open markets or having it served to them at hotels and restaurants. Where pheasants have been furnished to private individuals from the Game Farm it has been with an agreement that a percentage of the increase in excess of the original stock should be returned to the State, either directly to the farm, or delivered to others, by order, who would take up seriously the propagation of pheasants in captivity. In the Appendix will be found a chapter on pheasant raising, which contains in condensed form sufficient directions to insure success, provided the instructions are carefully followed.

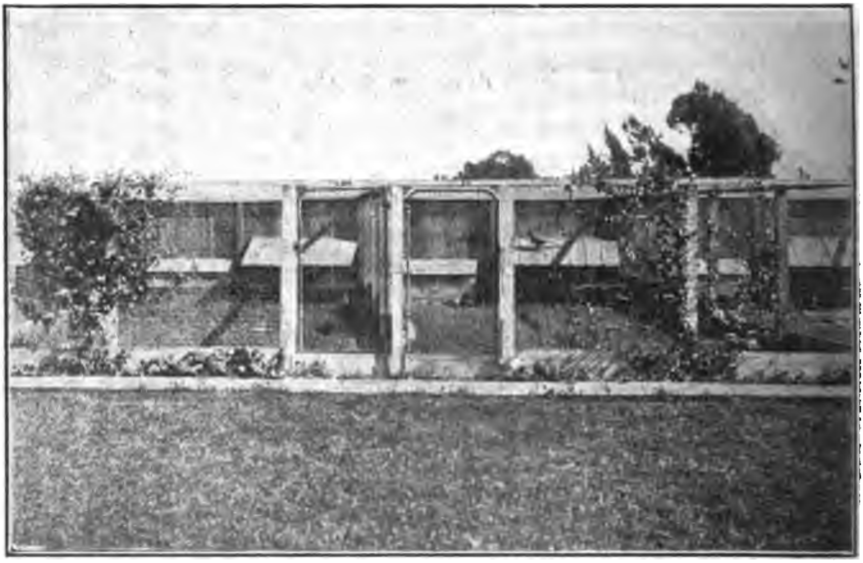
In the past three years much attention has been given to the transferring of valley quail from one part of the State to another. The birds are trapped in sections where they are abundant and shipped to others where through excessive shooting and deterioration, caused by inbreeding, the coveys have become greatly reduced. We are pleased to report that excellent results have followed in bringing together the unrelated stock, which is shown by larger coveys and stronger birds. In 1908 more than 2,000 quail were trapped and transferred; in 1909 our trappers delivered to the Game Farm 256 dozen, or more than 3,000 birds.

In the southern part of the State, under the direction of our Los Angeles office, some 1,500 quail were trapped in Lower California, transferred successfully to Los Angeles, where they were retained in a public park until the end of the open season, when they were liberated in suitable localities. Earnest efforts have been made and considerable time spent to obtain new blood from Mexico, but owing to unusual conditions but few birds have been procured from that country up to the present.

WILD TURKEYS (MELEAGRIS GALLOPAVO).

In response to requests and suggestions from a number of sportsmen in our State we had for several years made efforts to secure from Virginia, Texas, New Mexico, and Arizona, states in which wild turkeys are yet found, a sufficient number to give them a trial in California, believing they would establish themselves if given reasonable protection. We found the laws of New Mexico and Arizona so strictly drawn that no variety of game birds or animals could be shipped outside their boundaries for any purpose whatsoever. We appealed to the attorney generals of each state, and while we were assured of their personal inclination to help us out, they were bound by the law to rule against our request. We then decided to go outside of the United States and accordingly, in March, 1908, W. E. Van Slyke of San Bernardino, who had spent several years in Mexico, during which time he had hunted and killed wild turkeys, was detailed by this Commission to proceed to the State of Sinaloa, Mexico, for the purpose of procuring and shipping to our State as many of these great game birds as could be obtained in four months. He delivered 22 turkeys and 11 "chachalacas" at San Bernardino on June 15, 1908. They were liberated in two places in the San Bernardino range of mountains at an elevation of about 4,000 feet, under the direction of Senator H. M. Willis (author of the hunting license law). Encouraging reports having been received from these plants, a shipment of 30 young wild turkeys, raised at the Game Farm, was made to the same section in August of the present year.

The services of Mr. Van Slyke were reëngaged in October, 1908, to procure additional stock to be used for breeding purposes at the Game Farm. He was again successful and shipped to us, via Mazatlan, 26 fine specimens, which reached their destination in excellent condition. From this stock there was raised at the Game Farm in the spring of 1909, upwards of 100 strong, healthy, young birds, of which number 48 were sent in care of Mr. Jay Argabrite to Wawona in October, 1909, and liberated in the lower part of Yosemite Valley. Feed was scattered about, enough to supply their wants for several days. Although raised in captivity and not accustomed to anything higher for a perch than ordinary domestic fowls, they flew to the tops of tall trees immediately after liberation. Conditions seemed favorable for them so far as feed was concerned, and they have been reported as seen by several reliable persons, but no increase has been noted.



A section of breeding pens, Game Farm.

A shipment of 34 birds was made to the Sequoia National Park in eastern Tulare County in November, 1909, and placed in charge of Mr. Walter Fry, acting superintendent of the park, who has kept them under close observation and furnished this office with intelligent, trustworthy and most encouraging information concerning them. Quoting from his official report of January, 1910, he says:

> The wild nature of the turkey has fully reasserted itself; they are the most wary bird in the park. They will not run at the approach of an intruder, but will fly a mile before alighting.

In February, 1910, he reports finding a nest with 5 eggs; in March two nests, one with 11, the other with 16 eggs. On March 21st he reports "The wild turkeys doing fine. One hen has seven young birds." May 21st: "Wild turkeys seen are doing fine; many tracks of young birds, all seen at various places." Under date of July 14, 1910, referring to this season's shipment, he said:

> Wild turkeys were this day liberated in the Sequoia National Park at the mouth of the Marble Fork of the Kaneah River. They were in good condition and no losses sustained. I have left a man to care for them for a few days, although there is abundant feed for them at the place. They seem quite contented in their new surroundings and some flew up into the tall trees.

For the season of 1910 we are pleased to report remarkable success, having raised upwards of 200 young wild turkeys, of which number 85 were sent to the Sequoia National Park, 10 to citizens of Porterville, Tulare County, who liberated them in a particularly favorable section, and 30 to San Bernardino County. We feel greatly encouraged over the success attained thus far in the introduction of these magnificent game birds, and firmly believe that they will establish themselves permanently. There is no reason in our opinion why they should not thrive in this State. They have been known for many years in Arizona and New Mexico, and would, we believe, have reached California but for the great American desert, which encompasses our entire southern and eastern borders, and has always been an impassable barrier.

State Game Farm—Wild turkey hen with brood of young pheasants.

The young are easy to raise, being apparently a much hardier bird than the young of domesticated turkeys, whose vitality undoubtedly has suffered through too much domestication and inbreeding. The total cost to the hunting license fund of our venture in procuring and shipping from Mexico to our State the wild turkeys is less than $1,900.00, which includes the services and traveling expenses of Mr. Van Slyke for two trips.

Some question having been raised as to the genuineness of our stock, we were greatly pleased to have Prof. F. E. L. Beal of the United States Biological Survey, who has made a study of the wild turkey of the United States and Mexico, advise us after a visit to the Game Farm, that our stock was of the best; that there could be no doubt we had the genuine wild turkey. This was further confirmed by Dr. T. S. Palmer, in charge of Game Preservation of the United States, who pronounced them of the best strain of wild stock that had even come under his observation.

It is not commonly known that America, with special reference to Mexico, has given to the world the largest game bird, and perhaps the most important domestic fowl, in the turkey. The Pilgrims landing on our New England coast found them in plenty, and they filled an important place in the food supply of the Indians. It is reported they were introduced into England from Mexico in the sixteenth century, about 1541, and in 1573 had become the Christmas feast of the farmer.

Prof. S. F. Baird in a report to the Agricultural Department published in 1866, speaking of the Mexican turkey, says:

> Among the luxuries belonging to the high condition of civilization exhibited by the Mexican nation at the time of the Spanish conquest, was the possession by Montezuma of one of the most extensive zoological gardens on record, numbering nearly all the animals of that country, with others brought at much expense from great distances, and it is stated that turkeys were supplied as food in large numbers daily to the beasts of prey in the menagerie of the Mexican Emperor.

The well known ethnologist and ornithologist, George Bird Grinnell, in speaking of the wild turkey, says:

> The original wild turkey—to which the name *Meleagris gallopavo* was given—has been shown to be the bird later described by Gould as the Mexican wild turkey. It is notably different from the eastern form, for its tail, tail coverts, and the feathers of the lower rump are tipped with white or whitish, while the eastern and northern turkey has those feathers tipped with deep rusty or even with rich dark chestnut. The ordinary domestic turkey shows the whitish tippings of the feathers of tail, tail coverts, and lower rump: characteristics derived from its ancestor, the turkey of Mexico. The Mexican turkey occupies the wooden mountain slopes bordering the Mexican tablelands on the south and west, ranging north to Chihuahua, but it does not reach the United States. Mr. Nelson has shown where it grades into the Merriam's turkey on the north, while to the south, in southeastern Mexico and Central America, it is replaced by a striking distinct species, the brilliantly hued ocellated turkey.
>
> The eastern wild turkey, which was long considered the true *Meleagris gallopavo*, thus becomes a subspecies of the Mexican turkey, and is now known as *Meleagris gallopavo silvestris*.

THE HUNGARIAN PARTRIDGE.

During the past two years we have liberated in thirty-nine counties of the State about 2,400 of these famous European game birds.

A wide distribution has been given them from San Bernardino and San Diego counties in the south to Siskiyou County in the north. From many sections in the central, northern, and eastern parts of the State encouraging reports have been received. From the southern part of the State, San Bernardino County seems the only one in which the birds can now be found, and one covey containing 100 birds is reliably reported to be known in Yucaipe Valley. In Sonoma County, near Santa Rosa, several coveys aggregating 200 birds are reported. Increase is noted in Sierra, Siskiyou, Lake, Napa, Mendocino, San Benito, and Tehama counties. Excellent and trustworthy reports showing strong increase have come from Butte and Inyo counties.

According to Mr. Henry Oldys, assistant of the United States Biological Survey, during the past two years "nearly 40,000 partridges have been transplanted from the game covers of Europe into those of America," previous to which time less than 8,000 had been imported.

This indicates a strong and widespread belief in the adaptability of the Hungarian partridge to this country. It is unquestionably regarded as the most promising of the foreign birds whose introduction is being attempted. The small state of Connecticut has in the past three years imported and liberated nearly 7,000 and the sportsmen of that state have found so much encouragement in the increasing number of coveys that further efforts are being made to increase the supply by additional importation. Illinois, Indiana, Nebraska, and New Jersey have met with sufficient success to justify further expenditures. From the state of Washington it is reported "that along the northern border of the state Hungarian partridges have become almost as plentiful as pheasants." A carefully planned and successful attempt to introduce these birds is being carried on by Commissioner Sweeney of Indiana. He says, "I have 10,000 Hungarian partridges in the state of Indiana on 160 game preserves, and during the next three months will distribute about 8,000 more. They have thriven exceedingly well and are proving themselves finely adapted to Indiana climate and agricultural conditions. I feel they are the coming game bird of the Middle West."

The original habitat of the European partridge was on the shores of the Black Sea, and it is claimed "that from there they spread, following in the steps of grain cultivation throughout central and northern Europe." While we recognize that in the valley quail our State possesses perhaps the finest game bird in the world, under the rapidly changing conditions caused by clearing off and settling of the wild lands their breeding ground is steadily being reduced, the coveys growing fewer and smaller except in the remote sections of a few counties. To meet this situation and fill the gap caused by the encroachments of civilization it was decided to make a trial with the Hungarian partridge, which, according to some excellent authorities, is in a manner dependent on man, and tend to increase on arable or cultivated land, and where there is none, or it has been changed to pasture they seem to decrease. As they are not a "brush" bird, it is believed they would readily adapt themselves to the conditions to be found in our great grain and fruit growing valleys from which the valley quail have practically disappeared.

In size they are somewhat larger than our mountain quail, but much swifter on the wing. Their food covers a considerable variety, all kinds of insects, wild berries, grain and other seeds, and almost any kind of green food. In appearance they are not unlike the bobwhite quail of the Eastern States, but fully twice as large and more prettily colored. The head and throat are of a light reddish brown color, with yellow stripes on the top of the head. A distinguishing feature is a brown shield in the shape of a horseshoe more or less distinct on the breast.

Like the bobwhite the partridges of Europe sleep on the ground in circular groups with heads pointed outward, ready to detect the approach of an enemy from any quarter and to scatter in every direction when danger threatens. They are not polygamous, but separate into pairs early in spring and seek places for nesting and raising of their broods. At this time the males become very pugnacious, and will attack vigorously any intruders of his own kind. The nest is a very simple affair, built on the ground in a small hole after the fashion of our valley quail. The eggs are laid on the bare ground and covered with grass and leaves. When the hen has finished laying she proceeds to place the grass and leaves underneath the eggs. A young partridge hen will lay from 8 to 12 eggs, and an old hen from 16 to 22. The male assists the hen in rearing the brood, and shows much skill in protecting and feeding the young birds. When able to fly the old birds take them out to the roads to dust themselves and search for ants' eggs and insects, which form their chief diet until they are full grown.

Contributors to *London Field* in 1904, and again in 1909, in speaking of partridges say: "The value of Hungarian partridges has of late years been fully demonstrated and their introduction has now long passed the experimental stage." * * * "The advantage of turning out Hungarian birds can not be overestimated. They are suitable from every point of view, stronger and hardier than our native birds, and therefore more capable of rearing large coveys."

To the Yearbook of the United States Department of Agriculture for the year 1909, in a pamphlet on "Introduction of the Hungarian Partridge in the United States," we are indebted for excerpts and descriptions.

THE $20 BOUNTY ON MOUNTAIN LIONS.

As soon as it was seen that the hunting license law was proving a financial success, and realizing that strong demands had been made on the legislature for a bounty on these marauders by stock raisers and people of the mountains generally who had suffered through their depredations, the Board believed that the payment of a bounty on these animals would further popularize the hunting license law by making the people of the county beneficiaries under it, and decided that sufficient authorization existed in section 10 of the hunting license law, referring to expenditures for game preservation and restoration. This opinion was concurred in by the Attorney General, representing the State Board of Examiners, and by the State Controller. We, therefore, began in November, 1907, to pay a bounty of $20.00 for the scalp or pelt of every lion sent to this office. In order to protect the State against fraudulent claims an affidavit is required for every scalp from each individual presenting a claim, which must show when and where the lion had been killed, and requiring in addition a letter giving the circumstances of the case.

Some criticism was made as to the liberality of the bounty, but careful investigation showing that it required trained dogs and sometimes days and weeks of time to capture a single lion, the Board felt justified in making a generous allowance, believing that the greater the incentive, the quicker would be accomplished the desired result—the decimation, if not extermination, of the mountain lion, which is the natural enemy of the deer—besides which he destroys much of the farmer's live stock. He seems to have a fondness for colts, but does not spare calves, pigs, sheep, or goats. This is confirmed by letters that have been received in this office from the applicants for the bounty, yet fully 90 per cent of them indicate that the stomach contents are deer meat. It is also shown that a lion seldom devours the entire carcass, except driven to it by hunger; that he appears to prefer the fresh blood of an animal, after which the carcass is covered with leaves and brush and only eaten as a last resort.

The experienced mountaineers claim that the lion kills from one to three deer a week each. To substantiate this claim we append hereto several letters, representing hundreds of others, all bearing testimony to the damage the lion will do to live stock as well as to deer:

MENDOCINO COUNTY.

COVELO, CALIFORNIA, February 20, 1908.

Board of Fish Commissioners, San Francisco, Cal.

DEAR SIRS: I write to you on a subject that I came near writing to you about last spring, but as you have done what I should have urged, that is, put a bounty on panther, or California lions, I now write to commend you for doing that, as I don't think you could have done anything that would have done more toward the preservation of the deer than putting a bounty on panthers.

Mountain lion "treed."

In the southeastern part of Trinity County, where I was last summer with a band of sheep, I found about thirty deer carcasses in a strip of country about a mile long by a half a mile in width that had been killed by panthers during the winter and spring.

In the winter time the snow drives the deer down into the streams in large numbers and keeps them there till it goes off in the spring, and the panthers, also driven down from the higher mountains, kill a great many of them; and they are also very destructive on the farms in the spring and summer. So, taking everything into consideration, they are very destructive on the game.

The people in this part of the country appreciate the effort you are making to preserve the game.

Yours respectfully,

[Signed.] JAMES A. FOSTER, JR.

HUMBOLDT COUNTY.

SHELTER POINT, CALIFORNIA, February 3, 1909.

To the State Board of Fish Commissioners, San Francisco, Cal.

GENTLEMEN: I wish to write you a little hunting story which came under my notice. Since January 22, 1909, William Barrow, a resident of this section, has killed five panthers and one lynx. Mr. Barrow's last panther left a tale which shows how destructive these brutes are to the deer.

According to Mr. Barrow, his dogs would not run the track when he came across it in the snow, but he, being an experienced hunter, knew that, although it was a day old, he stood a good show to raise him before night, so he followed the track. He did not raise him the first day, but went again the next day. During the time he followed this one animal Mr. Barrow came across five deer, all killed by having their throats torn out, but not otherwise badly injured. He followed him up the mountain into the deep snow, where deer were plentiful, and it was here that the panther showed his work. He went on higher until the snow became very deep and deer scarce, then he circled back down and returned to the last deer which he had slain. It was at the last deer that Mr. Barrow's dogs surprised him, and the chase did not last long, for he evidently had eaten too much venison.

Mr. Barrow brought his scalp in to-night and told me this story. He also killed one lynx while taking the five panthers. Hunting panthers with dogs is mighty hard work, especially when a man has from two to five feet of snow to contend with, and if it was not for the $20.00 offered by your Board, you can rest assured that even Mr. Barrow would not be putting in time looking for that kind of game. That the $20.00 reward, or bounty, has done more for the protection of deer than anything else that ever happened, and I believe that if we were able to exterminate panthers, lynx, and cats, the country would be overrun with deer.

I have been a mountaineer for over eight years and a close observer of violators of game laws, and I think I am perfectly safe in saying it's not the people who make game scarce, it's wild animals. The people in this section are all in sympathy with the game laws and never complain about the one dollar license money. Game seems on the increase (all kinds, I mean), and there are but few violations.

Very truly yours,

[Signed.] C. A. CHAMBERLAIN, Forest Ranger.

LAKE COUNTY.

LOWER LAKE, CALIFORNIA, January 9, 1910.

Fish and Game Commissioners, San Francisco, Cal.

GENTLEMEN: As you wish a letter stating how this lion, killed November 15th, was taken, perhaps it will interest you to have the details just how it all came about.

Early on the morning of November 15th I received a telephone from one of my herders to the effect that some animal had made a raid on his flock of goats the night before and killed some seventeen or eighteen head.

I at once saddled my horse and in about three hours was at the place of the killing. I immediately concluded it was our old enemy, and didn't have to wait long until my pack of hounds were in hot pursuit. After about an hour's fast running, he was forced to take a tree in a thick jungle of brush. It took us some time to crawl to the foot of the tree, and it was then that my herder, who was slightly in advance, fired, but being somewhat excited failed to kill the lion, only causing it to come to the ground, where he was met by twelve hounds eager for a fight. All was excitement for a few minutes until I managed to bring him down with a couple of bullets from my Winchester. One of my dogs lay dead, while two more were bleeding from numerous gashes caused by the lion's claws. I was very much pleased with my day's work, as was a number of my neighbors. This lion had become quite a dread to the stockmen in this community, as in the last two years he had killed several colts and calves, besides a great number of small stock.

Kindly thanking you for the generous bounty, I am,

Most respectfully,

P. A. JONES.

MENDOCINO COUNTY.

POINT ARENA, CALIFORNIA, February 12, 1910.

Fish and Game Commission, San Francisco, Cal.

GENTLEMEN: I am shipping you to-day, February 12th, two panther hides, one small one weighing about 80 pounds and one large one weighing about 150 pounds. The large one was killed on the 8th instant and the smaller on the 10th. Both were treed with hounds. Although several carcasses of sheep were lying on the range, where they had killed them, one's stomach was full of deer meat, and the other was entirely empty. I also found the carcasses of several deer in that vicinity, which shows that the deer is a favorite prey of the panther.

Please return the hides by express to Point Arena. Unfortunately I broke several inches of the larger one's tail, which decreases the length. Originally it was close to 10 feet. Have made out two affidavits, which I hope will be sufficient. Please send bounty to Point Arena. Any information I can give you in regard to the habits of the panther will be freely given.

Yours respectfully,

L. N. CAMPBELL.

TRINITY COUNTY.

BEE GUM, CALIFORNIA, April, 1910.

To the Honorable Board of Fish Commissioners, San Francisco.

SIRS: I am shipping you to-day the scalps of three lion kittens and the skins of two old ones. I would like to add a few words in regard to lions, but first would like to say that there was a report started by two men in this neighborhood last fall that your honorable Board had discontinued the paying of a bounty on lions, which saved the lives of several lions and caused the death of a great many deer, to say nothing of the stock they killed. I myself knew nothing to the contrary until I happened to meet Mr. J. R. Watson of Trinity County, and he showed me a letter he had from you last fall in contradiction of the matter. I had had two dogs on the chain for two months and it took some time to get them in shape again.

These five lions represent a month's hunting and a scope of perhaps 35 or 40 miles of the roughest country in northern California. I have fine dogs. We got every lion that we found the sign of, with the single exception of the mother of the kittens, and I hope to get her yet. We hunted the largest of these lions, the male, fifteen days. His track was always too old for the dogs, but we finally struck it one morning fresh, and got him in an hour. In our hunt after this lion we found 12 deer that he had killed. Some he had only taken one small feed out of and never returned to them. I know this to be a fact, as we went morning after morning, hoping to strike his track at the carcasses, but a male lion will not do this if he can get a fresh deer. When he is hungry he never comes back. When they have all they want—they take one feed in twenty-four hours—and a large lion will eat a deer in two or three days. These are facts, as I have been in the mountains most of my life, and have made something of a study of animal life of all kinds. On the other hand, a female lion with kittens, and they hunt for the kittens until they are over a year old, of which they have from two to four, and there has been cases where five were found, but most often two to three; she kills a deer and takes a feed out of it, and the kits stay and finish it up while she gets another. A female lion with two or three kits will eat a large deer in twenty-four hours. It is an easy matter to get the kits if one can find where they have a deer.

It isn't the hunters that is getting away with the deer, but the wild animals. With a few exceptions in this neighborhood, the game laws are strictly adhered to. Hoping you will excuse me for taking up your time with this string, I am,

you will excuse me for taking up your time with this string, I am,

[Signed.] W. R. McARTHUR.

MENDOCINO COUNTY.

UPPER MATTOLE, CALIFORNIA, February 20, 1910.

Fish and Game Commission, San Francisco, Cal.

DEAR SIRS: Asking for information in regard to the three panther scalps sent to you, I will gladly furnish you with all the information I can in regard to the capture of them.

I was out on the range with my shepherd dog looking about stock when by chance I saw three panthers run around a point in the timber. Going down to where I saw them, my dog took the track and soon had one up in a tree. I got within reasonable good firing range and fired. The panther jumped and ran again, the dog in hot pursuit. On looking at his tracks where he jumped, I could see considerable blood. He ran about a quarter of a mile and treed again. Crawling up as closely as possible, I went to reload my gun and, behold, the shell had blowed off in my gun the previous shot, preventing me from reloading again. I then called my dog away and came home. Next morning, I went back to the place where I last saw the panther, taking with me three well trained hounds. I no sooner got to the place when the start dog took the track, and going slowly for about a quarter of a mile, started out briskly. Here I found two deer, a short distance apart, which they had been feeding on. The dogs ran half a mile and treed; going over there one dog had a small one up one tree, and a short distance away the other dog had another small one up a tree.

Killing both of them, I took a circle around the surrounding country in search of the third one. Had not traveled far until I came across another deer that hadn't been killed more than a few hours. The dogs took a fresh start, and in course of half an hour treed again. Going down to where they were, I could see a large panther in a tree. This was the mother of the two small ones. Well, as my gun was in good working order that day, I quickly dispatched this one, and this wound up what I consider a very profitable chase.

Starting back to my horse, and as I got near the place where I first saw them, I came across two more deer that had been killed recently, I suppose by these same panthers. Trusting this is satisfactory, I am,

Very truly yours,

[Signed.] GEO. C. LINDLEY.

LAKE COUNTY.

LOWER LAKE, CALIFORNIA, May 4, 1910.

Fish and Game Commissioners.

DEAR SIRS: I was out herding goats in the afternoon. It was about 2 o'clock. I was sitting under a tree watching the goats and I noticed something coming through the brush. I watched it and I saw it was a panther. It was after the tail end of the flock, and would have had a goat if I hadn't shot it as soon as I did. It had been in this country for several years—ten miles northeast of Lower Lake, Lake County. I have seen as many as a dozen small deer that the panther had caught. Some it had eaten almost up and others it had eaten all it wanted and covered the balance up with leaves and sticks. This is all I can tell you about the brute, only she has eaten lots of goats in this neighborhood.

Yours very truly,

TROY MEYERS.

It will be observed that, according to the letter of Mr. McArthur, one male lion in fifteen days killed twelve deer. That statement is corroborated by a letter of J. E. Simpson of Orland, Glenn County, who states that in following the tracks of one lion six days, in July, 1909, he came upon the carcasses of five deer. This would indicate that one deer a week for a lion is a very conservative estimate, and yet that means fifty-two deer per year for each lion, which represents by the killing of 1,100 lions a saving of more than 57,000 deer.

From November, 1907, to September 1, 1910, the total number of lion scalps or pelts received at this office was 1,132, about 500 a year, which represents a drain on our funds of $22,000.00. We are satisfied that this money has been well expended and that the damage done by them is not overestimated. During the past two years the reports from our deputies and forest rangers show a larger number of does and fawns than have been seen in many years. In the northern, eastern, and central portions of the State deer are showing a decided increase. In southern California, by reason of forest fires, which have destroyed much deer cover, and with a large and increasing hunting population, no increase can be noted.

HUNTING LICENSE LAW.

In the nineteenth biennial report of this Commission the establishment of a hunting license law was urgently recommended, and a forcible argument presented to the thirty-seventh session of the legislature, with the result that such a law was placed on the statute books. It has met with the unqualified approval and support of all our people who are interested in sporting and the preservation of our game. The splendid financial returns have encouraged other states to follow our example. During the past two years New York, New Jersey, Iowa, Texas, Nevada, and Arizona has each come into line with a hunting license law, following closely the law of California. We are informed that the establishment of a similar law in the state of New York is due to the data and material furnished by us to the leading sportsmen of New York, who presented it before the legislature of that state. All of the states in the Union, also Alaska and the Canadian Provinces, require a license in one form or another. In a few states a license is not required from a resident, but nonresident licenses are required in all of them except Arkansas, whose nonresidents are not permitted to hunt. Four states, South Carolina, Tennessee, Georgia, and Louisiana, require that a market hunter take out a special license, the fee being $50.00 in the former, $25.00 in Tennessee and Georgia, and $10.00 in Louisiana.

In a number of states the *resident* license fee is greater than in California; Alabama charges $3.00, Washington and Alaska $5.00, Michigan and Wyoming $1.50, Connecticut, Vermont, and Oklahoma $1.25.

Some states issue to aliens a license for the same amount as a nonresident of the State, but a strong tendency is noted to make the fee for an alien greater than that of a citizen of the country. Our alien license fee of $25.00 is exceeded by a number of other states, for example, in Utah and Alaska the fee is $100.00, in Washington and Wyoming $50.00. In British Columbia, Yukon, and Saskatchewan $100.00 is exacted of an alien and nonresident alike. Certain provinces of Canada, Ontario, Manitoba, New Brunswick, and Newfoundland charge $50.00. The State of Pennsylvania goes even further and prohibits aliens from hunting or owning guns in the state.

As to the constitutionality of the law requiring aliens to pay a larger fee than citizens of the state, a recent decision of the Supreme Court of Alabama in the case of *Luke* vs. *Calhoun County* on the right of the state to impose different license fees, the language used by the court is clean-cut and decisive. It says in part: "It is a legal and political axiom that protection and allegiance are reciprocal. Aliens, resident or sojourning here, do not owe the full measure of allegiance exacted from the citizen, nor can they enjoy the rights, privileges, and immunities of citizenship."

At the last session of the legislature we recommended that the law be amended to permit a 10 per cent commission to be paid to every person selling licenses, except a fish and game commissioner. This became necessary in order to provide a way in which county clerks could be compensated for the money actually expended in postage, the labor involved in the issuing of licenses, and correspondence in relation thereto. A number of bills were introduced in the interest of county clerks asking that a commission be allowed ranging from 5 to 20 per cent. We believe the allowance of 10 per cent is ample. It means an annual drain on the fish and game preservation fund of at least $12,000.00. As the law has become thoroughly understood and the county clerks have distributed licenses in the principal towns in their respective counties, the postage charges have been greatly reduced. In none of them has it exceeded 4 per cent, leaving a margin of profit for time and labor of 6 per cent, which may be considered reasonable compensation.

The money derived from the sale of hunting licenses is used for the payments of salaries to deputies directly engaged in the enforcement of the game laws, in commissions to county clerks, the maintenance of the Game Farm, bounties on mountain lions, the trapping, distribution, and introduction of game birds, a proportion of office expenses, and the propagation of game fishes. Those who pay for hunting licenses are not contributing toward the support of the *commercial* hatcheries.

All fines of whatever character are paid into the same fund as the hunting license money, the fish and game preservation fund; they amount approximately to $16,000.00 a year, which more than meets the expense involved in the propagation of trout and other game fishes.

The amount of hunting license sales by counties since the law became effective, July 1, 1907, is shown in the tables given in the Appendix. The apparent discrepancy between these records and the amount shown by our financial statement is due to the fact that at the close of the fiscal year all county clerks had not made final settlement with the controller.

RECOMMENDATIONS.

Much confusion has been caused by the passage of county ordinances in which the seasons for the taking of fish and game have been changed by county boards of supervisors. While we realize that in some sections which are easy of access from the densely populated centers, it would seem to be the part of wisdom to shorten seasons, the method that has been followed could be greatly improved. The supervisors act under the authority that is found in section 25, subdivision 28 of the county government act, which provides that boards of supervisors in their respective counties have jurisdiction and power "to provide by ordinances not in conflict with the general laws of the State for the protection of fish and game, and *may shorten* the seasons for the taking or killing of fish and game within the dates fixed by the general State law, but *can not lengthen the same.*" We believe that the Board of Fish and Game Commissioners should be consulted whenever a change, however slight, from the state law, is contemplated. The Fish and Game Commissioners through their legal advisor, the Attorney General, could then prepare the ordinance, the terms and conditions of which should be mutually agreed upon, and in due course given approval by the supervisors in executive session. There should also be a time fixed when such action could be taken. This would give the Fish and Game Commissioners an opportunity to have these changes duly printed and distributed. Under existing conditions the laws are changed by county ordinances without consultation with the State Board of Fish and Game Commissioners, and no notification is given that any action has been taken, resulting in much confusion and frequently unintentional violations of county ordinances.

With respect to changes in the existing laws, we would recommend the following modifications:

Section 626*g*, relating to tree squirrels; opening the season on August 1st instead of September 1st, and eliminating the bag limit.

Amend section 626*a*, relating to doves, by changing the opening date from July 15th to August 1st, and extending it from October 15th to November 1st.

Amend section 626*k* to permit pheasants raised in captivity to be sold in the markets under proper restrictions.

Amend section 626*f*, relating to deer, by reducing the open season one month, beginning on the 1st day of August and closing October 15th.

Establish a close season of seven months on wild pigeons from the 1st day of January to the 1st day of August of each year, and fixing a bag limit of 20.

We respectfully recommend the following amendments to the laws regarding the taking or possession of fish, shrimp, etc.:

Amend section 628 by making it an offense for any person to take or have in his possession during any one calendar day more than five pounds of dried shrimp or shrimp shells of shrimp taken in the waters of this State.

Amend section 628, relating to crabs, by establishing a close season of two years on the taking or possession of any crabs (*Cancer magister*).

Amend section 628, relating to the sale of catfish, by defining a dressed catfish as one measuring not less than eight inches, exclusive of the head.

Amend section 628, as it refers to abalone taken in the waters of this State, by prohibiting the shipment of dried abalones or unmanufactured abalone shells out of the State, and permitting the capture and possession of red and green abalones measuring not less than sixteen inches in circumference, and black abalone not less than twelve inches in circumference—around the outer edge of the shell.

Amend section 628*a*, relating to striped bass, by prohibiting the exportation of any striped bass from the State of California.

Amend section 632, relating to trout, so that trout raised in captivity and measuring not less than seven inches in length may be sold in the markets between the 1st of April and the 1st of February of the year following, under restrictions to be recommended by the Board of Fish and Game Commissioners; also authorizing said Board of Fish and Game Commissioners to furnish at cost a reasonable number of trout eggs or ova to private individuals or companies who desire to engage in and carry on such an industry, when in the judgment of the said Commissioners a sufficient number of eggs has first been taken to meet the needs of the public waters of the State.

ACKNOWLEDGMENTS.

To you officially and personally we desire to express our sincere appreciation for the encouragement and practical assistance rendered to us in carrying on our work. You have given earnest and careful consideration to every measure recommended by us. We feel that through your efforts we are indebted largely for the hunting license law, which is the most important achievement in the interests of fish and game protection in the history of the State.

The Commission also desires to acknowledge its gratitude to the officers and subordinates of the following railway and transportation companies for courtesies extended to our men and for the uninterrupted and free transportation of eggs and fish—and so long as the statutes of this State permitted—free transportation for *all* of our employees:

The Southern Pacific Company; the Santa Fe Company; the Sierra Railway Company; to the California Northwestern Company; the Lake Tahoe Railway Transportation Company; the Nevada-California-Oregon Railway Company; the Boca and Loyalton Railway Company, and to the Pacific Coast Steamship Company. To Hon. George M. Bowers, United States Commissioner of Fisheries at Washington, D. C., and to his able assistants, Dr. H. M. Smith, Dr. B. W. Evermann, J. G. Dunlap, also Captain G. H. Lambson, superintendent of the salmon egg-collecting stations in California, we are under obligations for their cordial support and assistance in carrying on the fish cultural work. To Mr. A. Christeson, general manager of Wells, Fargo & Co., Mr. Thos. Woods, superintendent, Mr. J. C. Tice, and Mr. E. E. Honn, and in fact all the superintendents, agents and employees of that company, we are especially indebted for many privileges and unfailing courtesies. All requests have received respectful consideration, and in many instances voluntary assistance has been rendered that proved of great value to the State.

We desire also to extend our thanks to Mr. D. L. Bliss, Jr., superintendent of Lake Tahoe Railway and Transportation Company, for many courtesies and substantial assistance rendered in the free transportation of our men engaged in fish cultural work, and also the free handling of trout eggs and trout fry. To Messrs. Lawrence and Comstock, at Tallac, we are also indebted for the free use of teams for hauling fish, eggs, and supplies, and for many other privileges. To Washburn Brothers of Wawona our thanks are due for courtesies and assistance rendered our representatives and the free transportation of eggs, also the fry from the hatchery.

We are also indebted to Major W. W. Forsyth, acting superintendent of Yosemite National Park, for many courtesies and valuable assistance.

In submitting this report of the work accomplished, which practically covers a period of four years, we trust it will meet with your approval and that the recommendations made by us, which represent our best judgment, will be enacted into laws.

We have fully appreciated our responsibility in disbursing the large sums of money now at the disposal of this Commission, and have endeavored to expend it judiciously, and where in our opinion it would do the greatest good to the greatest number, always bearing in mind the possibility of a decrease in revenue, coupled with the fact that under the law the property under our control, valued at thousands of dollars, can not be insured. We have considered it a wise precaution to be prepared for any emergency as is shown by the balance in the state treasury at the close of the fiscal year, amounting to $73,318.21.

Yours respectfully,

F. W. VAN SICKLEN,
M. J. CONNELL,
W. G. HENSHAW,
Fish and Game Commissioners.

San Francisco, Cal., September 1, 1910.

APPENDIX.

TWENTY-FIRST BIENNIAL REPORT OF FISH AND GAME COMMISSION.

TWENTIETH BIENNIAL REPORT AND FINANCIAL STATEMENT

OF THE

STATE BOARD OF FISH COMMISSIONERS

FOR THE YEARS 1907-1908.

To the Hon. JAMES N. GILLETT, *Governor State of California.*

SIR: We have the honor to submit for your consideration, the following preliminary report as a brief record of the work and expenditures of this Commission covering the biennial period of the fifty-eighth and fifty-ninth fiscal years. Also the recommendations with respect to the changes in the fish and game laws of this State based upon our experience and close study of these important subjects, which we deem advisable.

For the purpose of comparison, we are submitting the financial statement for the fifty-sixth and fifty-seventh fiscal years to show the increase, both in resources and expenditures, also the decided increase in the number of arrests and total amount paid in fines over any other biennial period in the history of this Commission. This is due to the splendid results that have followed the establishment of a hunting license law, which in our opinion is the most popular law ever placed on our statute books. The returns on hunting licenses exceeded about four times the estimated number of the most sanguine.

Our full biennial report, which is now under compilation, will show more in detail the record of work performed at our different hatchery stations and other general work of the Commission.

FINANCIAL STATEMENT.

The resources and expenditures of this Commission have been as follows for the fifty-sixth and fifty-seventh fiscal years, ending June 30, 1906:

FIFTY-SIXTH FISCAL YEAR.

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$12,500 00	$12,500 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Appropriation for restoration and preservation of game	7,500 00	7,500 00
Steelhead Propagation Fund—		
Balance on hand July 1, 1904	625 33	
Drawn from fund during year		489 62
Balance on hand June 30, 1905		135 71
Game Preservation Fund—		
Balance on hand July 1, 1904	1,916 86	
Receipts from fines during the year	4,019 15	
Amounts drawn during year		4,620 55
Balance on hand July 30, 1905		1,315 46
Fish Commission Fund—		
Balance on hand July 1, 1904	7,825 52	
Receipts from licenses and fines	10,026 85	
Amount drawn from fund during year		12,877 57
Balance on hand June 30, 1905		4,974 80
Totals	$53,913 21	$53,913 21

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$12,500 00	$12,500 00
Appropriation for restoration and preservation of game	12,500 00	12,500 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Steelhead Propagation Fund—		
Balance on hand July 1, 1905	135 71	
Drawn from fund during year		135 71
Game Preservation Fund—		
Balance on hand July 1, 1905	1,315 46	
Receipts from fines during the year	5,295 89	
Amount drawn during year		4,888 80
Balance on hand June 30, 1906		1,722 55
Fish Commission Fund—		
Balance on hand July 1, 1905	4,974 30	
Receipts from licenses and fines	10,340 35	
Amount drawn from fund during year		10,255 54
Balance on hand June 30, 1906		5,059 11
Totals	$57,061 71	$57,061 71

Resources and expenditures of this Commission for the fifty-eighth and fifty-ninth fiscal years, ending June 30, 1908, were as follows:

FIFTY-EIGHTH FISCAL YEAR.

	Resources.	Disbursements.
Appropriation for support and maintenance of State hatcheries	$20,000 00	$20,000 00
Appropriation for restoration and preservation of game	10,000 00	10,000 00
Appropriation for restoration and preservation of fish	10,000 00	10,000 00
Game Preservation Fund—		
Balance on hand July 1, 1906	1,722 55	
Receipts during the year from fines	3,506 93	
Amount drawn during the year		3,532 31
Balance on hand June 30, 1907		1,697 17
Fish Commission Fund—		
Balance on hand July 1, 1906	5,059 11	
Receipts from fisherman's licenses	5,930 00	
Receipts from fines	4,089 23	
Amount drawn during the year		10,040 45
Balance on hand June 30, 1907		4,987 89
Totals	$60,257 82	$60,257 82

FIFTY-NINTH FISCAL YEAR.

Appropriation for support and maintenance of State hatcheries		$20,000 00	$20,000 00
Appropriation for restoration and preservation of game		10,000 00	10,000 00
Appropriation for restoration and preservation of fish		10,000 00	10,000 00
Game Preservation Fund—			
Balance on hand July 1, 1907		1,697 17	
Receipts during the year—			
From fines	$7,425 93	124,044 19	
From hunting licenses	116,579 11		
From sale of deer hides	39 15		
Amount drawn during year			46,641 70
Bounty on 287 California lions, October 15, 1907, to June 30, 1908			5,740 00
Balance on hand June 30, 1908			73,359 66
Fish Commission Fund—			
Balance on hand July 1, 1907		4,987 89	
Receipts from fisherman's licenses		3,784 10	
Receipts from fines		8,683 69	
Amount drawn during year			11,064 64
Balance on hand June 30, 1908			6,391 04
Fund for Fish Distribution Car—			
Appropriation		7,500 00	
Amount drawn during year			5,458 76
Balance on hand June 30, 1908			2,041 24
Fund for Fish Repository in Tuolumne County—			
Appropriation		500 00	
Amount drawn during year			299 95
Balance on hand June 30, 1908			200 05
Totals		$191,197 04	$191,197 04

The following comparative table is interesting, showing the increase in the number of arrests from year to year and the amount of fines imposed during each two years for the past twelve years:

Biennial period.	Violation of deer law.		Violation of quail law.		Violation of duck law.		Violation of salmon law.		Violation of striped bass law.		Illegally used nets seized and confiscated.	Total fines from all sources.
	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.	No. of arrests.	Fines.		
1897-1898...	11	$100	7	$40	14	$220	19	$200	8	$100	30	$3,125 00
1899-1900...	37	785	3	350	6	220	18	900	47	805	23	5,779 00
1901-1902...	75	1,600	97	1,775	30	545	23	2,400	26	185	28	9,497 00
1903-1904...	135	2,035	109	2,344	30	375	15	1,040	69	1,340	47	11,738 00
1905-1906...	172	4,355	106	2,270	75	1,530	39	3,350	103	4,120	59	23,154 90
1907-1908...	196	5,230	102	2,337	63	1,124	27	2,900	153	5,401	85	30,122 25

We respectfully recommend the following amendments to the game laws:

Amend section 626 by making the open season for valley quail, rail, snipe, curlew, ibis, plover, or other shore birds to commence with the duck law on October 1st instead of October 15th, and close the season for ducks and these other birds on February 1st instead of February 15th, except the Wilson snipe.

We also recommend that a close season of two years be established on mountain quail and grouse or sage hen.

Amend section 626*c* by adding to the list of game birds protected at all times, the wild turkey, which is now being imported into this State.

Amend section 626*d* by reducing the bag limit on ducks from thirty-five to twenty-five, also to include black sea brant and to reduce the bag limit of quail, doves, snipe, curlew, ibis, plover, rail, or other shore birds from twenty-five to twenty.

We would also recommend that a law be enacted to prohibit the use of any trained animals or live blind to use as a means of approach for the purpose of killing any wild ducks or other waterfowl.

We also recommend the present hunting license be amended to include fishing or angling, the amount to remain the same, and to be used for both, or either, hunting or fishing, and the money derived from such hunting license sales be paid into one fund to be known as the fish and game preservation fund, into which fund the unexpended balances remaining in the fish commission fund and game preservation fund, respectively, shall be merged.

We recommend the following amendments to the fish laws:

Amend section 628, relating to crabs, by raising the present close season September and October, and establishing in lieu thereof a close season of four months beginning November 1st and ending February 28th. And to establish a close season for at least two years on lobster or crawfish.

Amend section 628*a*, relating to striped bass, by establishing a close season of six weeks from the 1st day of May to the 15th day of June, during which time (the principal spawning season of these fish) their capture by nets and seines shall be prohibited.

Amend section 632½, referring to steelhead trout, by removing the close season that existed during the months of September and October, and to open the season for the capture of steelhead trout in all waters of the State April 1st, and to extend to February 1st the following year.

Amend section 634 by reducing the mesh of net at which salmon can be taken from 7½ to 6½ inches, and reduce the mesh of net by which striped bass and shad can be taken to 5½ inches.

Amend section 636 by striking out the word "set" and substituting the word "use."

Amend the act of 1887, March 21st, referring to the vocation of fishing by reducing the amount of license fee to a citizen of the United States from $5.00 to $2.50 and raising the fee to any person not a citizen of the United States to $10.

We append herewith an additional statement of the condition of the game preservation fund, showing the amount remaining in this fund on February 1, 1909, from the sale of hunting licenses and fines collected, together with our estimate of expenses for game preservation to the close of the fiscal year, June 30, 1909.

Amount in license fund February 1, 1909		$106,276 00
Amount received for fines since July 1, 1908		4,161 00
		$110,437 00
Estimate of expenses of the Commission for game preservation for the next five months:		
Salary and expenses of 62 deputies and assistants, $7,560 per month	$37,800 00	
For rewards in conviction cases paid outside deputies, monthly average $450	2,250 00	
Expenses of Game Farm, monthly average $300	1,500 00	
Incidentals, including office rent, expressage, license tags, telephone, and telegraph, fuel for launches, cost of prosecutions in justice and superior courts, postage, stationery, etc., monthly average $660	3,300 00	
Repair and maintenance of car	500 00	
Bounty on lions per month, $600	3,000 00	
Hungarian partridges and pheasants (contracted for)	3,000 00	
Trapping and distributing quail and procuring and importing wild turkeys	4,000 00	
Proposed expenditures for Hungarian partridges	5,000 00	
		60,350 00
Balance		$50,087 00

N. B.—It should be borne in mind that it will be four months after the end of the present fiscal year, during which time no license money will be available and the average monthly expense of about $12,000—or, say, $48,000—must be provided for from our surplus. Also payment for cottage at Game Farm, amounting to $1,750, now being built under contract.

Respectfully submitted.

GEORGE STONE,
F. W. VAN SICKLEN,
M. J. CONNELL,
Board of Fish Commissioners.

REPORT ON RECEIPTS AND DISBURSEMENTS OF FISH AND GAME COMMISSION, TWO YEARS ENDING JUNE 30, 1910.

By Price, Waterhouse & Co., Chartered Accountants.

San Francisco, September 15, 1910.

California Fish and Game Commission, San Francisco, Cal.

Dear Sirs: In accordance with your instructions, we have made an examination of the books and accounts of the California Fish and Game Commission for the two years ending June 30, 1910, and we attach hereto the following schedules:

Statement of receipts and disbursements, year ending June 30, 1909, Exhibit "A."

Statement of receipts and disbursements, year ending June 30, 1910, Exhibit "B."

From the statements submitted it will be seen that the accounts have materially changed since July 1, 1908, inasmuch as the funds for the restoration and preservation of game and the restoration and preservation of fish have been discontinued altogether, and the game preservation fund and the fish commission fund have been merged into a fund called "Fish and Game Preservation Fund," which was created and approved on March 15, 1909.

For the year ending June 30, 1909, the fish and game preservation fund received credit for the sum of $136,064.84 from hunting and fishing licenses, fines and fish eggs sold to the German Government. In addition the following appropriations were made by the legislature:

Support and maintenance of hatcheries	$20,000 00
Restoration and preservation of game	10,000 00
Restoration and preservation of fish	10,000 00
	$40,000 00

For the year ending June 30, 1910, there was only one appropriation made of $20,000.00 for the support and maintenance of hatcheries, which fund also received credit for the receipts from fishing licenses sold, which amounted to $21,982.50.

We have limited our examination, in so far as the records of the two years above referred to are concerned, to the checking of all disbursements by the Chief Deputy, and to see that all hunting and fishing licenses issued for the year ending June 30, 1910, have been properly accounted for. Regarding the disbursements by the Chief Deputy we have seen vouchers or other acknowledgments for all, with the exception of two small disbursements amounting to $11.88. As no complete classification of the disbursements has been made, we are unable to make such a classification now, but we will outline a system which will provide for this in the future.

We have seen that all receipts from the sale of hunting licenses for the year ending June 30, 1910, have been properly recorded and accounted for to the State Treasurer, and we have seen acknowledgments from the State Controller stating that all fishing licenses for the two years which remained unsold have been properly returned to him. We have also seen a letter from the State Controller which verified the balances in the treasury at June 30, 1910.

	The value of the hunting licenses printed for the season 1909–10 was—which is accounted for as follows:			$165,750 00
	Cash receipts during year		$126,734 35	
	Less:			
	Amounts applying to prior year:			
1909.				
July 6	Marin County	$905 00		
6	San Francisco County	1 00		
9	Siskiyou County	3 00		
12	Tehama County	2 00		
15	San Francisco office	2,338 25		
28	Amador County	2 00		
29	Alameda County	100 00		
Aug. 9	Modoc County	113 00		
21	Tuolumne County	10 00		
Dec. 21	Merced County	15 00		
			3,480 25	
				$123,254 10
	Add:			
	Amounts collected since June 30, 1910, applying on year 1909–10:			
1910.				
July 5	Riverside County	$1 00		
6	San Francisco office	2,221 00		
8	Imperial County	44 50		
12	San Mateo County	125 00		
15	Madera County	167 60		
15	San Benito County	1,060 00		
23	Sonoma County	576 00		
25	Inyo County	16 00		
25	Placer County	986 00		
			5,197 10	
			$128,451 20	
	Unsold licenses, duplicates, etc.		37,259 00	
	Express charges on remittances from county clerks to Sacramento		83 80	
	Licenses still owed for by Inyo county clerk (5 at $10.00)		50 00	
			$165,844 00	
	Less:			
	Amount overpaid by San Diego County	$85 00		
	$1.00 license changed to $10.00—Shasta County	9 00		
			94 00	
				$165,750 00

In addition to the work done by us on the accounts for the past two years, we have also checked the following on account of the present year 1910-11:

Hunting licenses printed by the Union Lithograph Company as follows:

Aliens, 500 at $25.00	$12,500 00
Nonresident citizens, 500 at $10.00	5,000 00
Resident citizens, 135,000 at $1.00	135,000 00
	$152,500 00

At the time of our audit, August 24th, the following had been issued:

	Alien.	Non-resident.	Resident.	Value.
San Francisco office	25	10	4,200	$4,925 00
Firms, etc.			5,350	5,350 00
Los Angeles office	5	5	2,500	2,675 00
Fresno office			200	200 00
A. F. Lea			50	50 00
Harry Warr			50	50 00
County clerks	305	300	113,900	124,525 00
	335	315	126,250	$137,775 00
Leaving unissued	165	185	8,750	14,725 00
	500	500	135,000	$152,500 00

We counted all the licenses which were unissued and those unsold in the San Francisco office, and we saw receipts for all licenses issued to county clerks, etc., with the exception of Inyo County, for 5 aliens, 10 nonresidents, and 1,000 residents' licenses forwarded on June 3, 1910. We found on August 24, 1910, that the San Francisco office had collected for—

Licenses sold		$9,535 00
Which was accounted for as follows:		
Mercantile National Bank, San Francisco (per certificate)	$9,436 45	
Cash on hand	23 55	
Checks on hand	24 00	
Board of health licenses issued	26 00	
Express charges on coin from Sacramento	14 20	
Sundry vouchers	15 75	
		9,539 95
Over		$4 95
Being:		
Unlocated difference	$2 00	
Interest on bank balance	4 60	
	$6 60	
Less:		
Bank collection charge	1 65	
		$4 95

It will be seen from the above that a small amount of the license sales has been withheld in order to pay for express charges and certain small items of expense which require immediate payment. We consider that all cash received from the sale of licenses should be deposited daily, and that a fund of say $100.00, or $250.00 if necessary, should be created, out of which all such disbursements can be made.

We notice that hunting licenses are printed by the Union Lithograph Company, in whose possession the dies for these licenses, we presume, are still held. It would seem to us to be an easy matter to get an additional lot of these licenses printed, and to any one in the San Francisco office who is familiar with the sale of such licenses they could be sold and the funds never reach the hands of the Commissioners. We think that the hunting licenses should come through the State Controller's office in the same manner as the fishing licenses. This would eliminate practically all chance of getting additional licenses printed.

The following amount of fishing licenses were received from the State Controller for the year 1910-11:

2,000 aliens at $10.00	$20,000 00
2,000 citizens at $2.50	5,000 00
	$25,000 00

At August 24, 1910, we found that of this amount the following had been sold:

1,274 aliens at $10.00		$12,740 00
1,088 citizens at $2.50		2,720 00
		$15,460 00
Which was accounted for by:		
Bank of California certificate	$10,457 50	
Remittances to State Treasurer August 9, 1910	5,000 00	
Cash on hand	2 50	
		$15,460 00

The licenses unsold in the San Francisco office were counted and found in order, and the licenses in hands of deputies were all verified by letters from the various deputies.

While the fishing licenses expire on March 31st of each year, the receipts from license sales have been considered as revenue applying on the following fiscal year ending June 30th.

We find that there are approximately $40,000.00 receipts from sale of licenses and $120,000.00 disbursements passing through the hands of the Chief Deputy annually, and that the only bond given by any one is for $2,000.00, from the president of the Board of Fish and Game Commissioners. This would appear to us to be entirely inadequate, and we would suggest that provision should be made for the bonding of the Chief Deputy and his cashier.

We have not checked any disbursements which have been made directly through the State Treasurer, as we understand that such vouchers have all been passed by a Board of Examiners and also the State Controller's office.

We shall be pleased to give you any further information which you may desire.

Yours very truly,

PRICE, WATERHOUSE & CO.,
Chartered Accountants.

EXHIBIT "A."

California Fish and Game Commission, Statement of Receipts and Disbursements Year Ending June 30, 1910.

Showing game preservation fund and fish commission fund combined (*law changed March 15, 1909*).

Game preservation fund. }
Fish commission fund. } *Fish and game preservation fund:*

Balance in hands of State Treasurer, July 1, 1908		$79,750 70
Less:		
June, 1908, expenditures		7,477 70
		$72,273 00
Receipts:		
Hunting licenses	$113,476 93	
Fishing licenses	6,647 50	
Fines	15,565 41	
Fish eggs sold	375 00	
		136,064 84
		$208,337 84
Disbursements:		
State Treasurer	$19,126 99	
Chief Deputy	112,557 83	
		131,684 82
Balance June 30, 1909		$76,653 02
Being:		
In hands of State Treasurer	$87,444 85	
Less:		
June, 1909, expenditures	10,791 83	
		$76,653 02
Support and maintenance of hatcheries fund:		
Appropriation for year	$20,000 00	
Disbursements by State Treasurer		$20,000 00
Restoration and preservation of game:		
Appropriation for year	$10,000 00	
Disbursements by State Treasurer		$10,000 00
Restoration and preservation of fish:		
Appropriation for year	$10,000 00	
Disbursements by State Treasurer		$10,000 00
Fund for fish repository in Tuolumne County:		
Balance July 1, 1908 (no change)		$200 05

EXHIBIT "B."

California Fish and Game Commission, Statement of Receipts and Disbursements Year Ending June 30, 1910.

Fish and game preservation fund:		
Balance July 1, 1909		$76,653 02
Receipts:		
Hunting licenses	$126,734 35	
Fines	19,789 27	
Game Farm earnings	938 22	
		147,461 84
		$224,114 86
Disbursements:		
State Treasurer	$38,163 71	
Chief Deputy	112,632 94	
		150,796 65
Balance June 30, 1910		$73,318 21
Being:		
In hands of State Treasurer	$89,275 04	
Less:		
June, 1910, expenditures	15,956 83	
	$73,318 21	
Support and maintenance of hatcheries fund:		
Appropriation for year		$20,000 00
Receipts—Fishing licenses		21,982 50
		$41,982 50
Disbursements:		
State Treasurer	$32,302 75	
Chief Deputy	9,679 75	
		$41,982 50

REPORTS OF SUPERINTENDENT OF SISSON HATCHERY, SEASONS 1908 AND 1909.

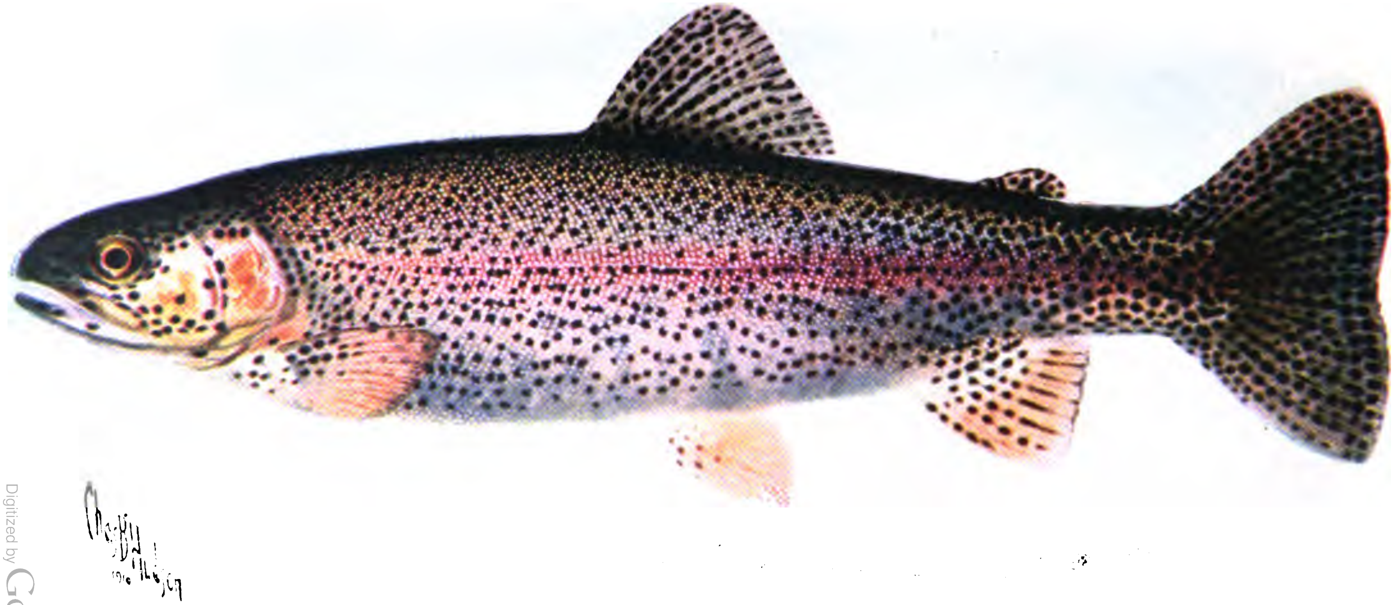
SISSON, CAL., November 30, 1908.

Honorable Board of Fish Commissioners, for the State of California.

GENTLEMEN: In accordance with the instructions of your honorable Board, I herewith submit a brief report of the work done at Sisson Station during the years 1907–1908. It is with pleasure that I can report the station in a prosperous condition—due in a great measure to the able support given to me by your honorable Board and Chief Deputy. I will endeavor to outline the principal work that has been done at this station in the last two years. During the period since my last report the necessary repairs have been kept up, new ponds constructed, a pumping plant for irrigating the grounds and for washing the ponds with water under pressure (through a hose and nozzle), the erection of a poacher proof fence around the grounds, the construction of a new hatchery for salmon work, the building of a raceway below the ponds, are among the main improvements.

The electric lighting plant has been enlarged by the installation of a new dynamo, and a new set of carbonized troughs has been set up in the hatchery "C." The source of our water supply has been changed to a point lower down on Spring Creek. When the Commission purchased the "Watson Tract" of land a water right and ditch went with it. The head of this ditch was in Spring Creek, a couple of hundred yards below the head of the old canal. The ground slopes on an even incline toward the hatchery, and the two ditches approach each other until they are parallel at a point a quarter of a mile from the hatchery. There we turned the lower ditch into the old canal. This was done to secure a steadier flow of water. At the source of the old canal are two other ditches that all have their source in the same dam, and as the flow was increased or decreased by the owners of these ditches, it caused us more or less trouble at the hatcheries, as we must have a steady flow of water. This change did not interfere with the flow of water in the old ditch or canal. The same amount has been in use at this station for the past seven years.

Several of the ponds were changed and new ones built to accommodate our increasing stock of brood fish. We now have at this station 45 ponds and four hatcheries for the rearing of fish. The hatcheries contain 300 troughs that are in almost constant use. A team of horses



RAINBOW TROUT (Salmo irideus)

DRAWN FROM CAPTIVE FEMALE FISH 11 3-4 INCHES LONG

and wagons have been purchased, and they have proved to be an economical investment. In the fall of 1907 we erected the fourth hatchery, "D," as we did not have room enough to handle the extra number of trout eggs that we were expecting to take, along with the salmon eggs. A building 50 by 75 feet was put up over one of the salmon batteries. It is a plain, substantial structure, with a corrugated iron roof. It is fitted up with the old troughs used in the salmon battery, and has been in use ever since it was built. Hatchery "A," the first building erected on the Sisson Hatchery grounds in the fall of 1888, is now in an unsafe condition. The foundation, sills, and floor are badly rotted, and the tank and wall on the north side are in the same condition. I would respectfully recommend that a new hatchery be built on a larger and more modern plan this coming season. The building is not safe any longer. We have repaired it several times in the last ten years. It is now in a state of decay beyond any repairs that are practical. In its place should be erected a modern building, fitted up with the latest and more improved system of hatching and rearing troughs.

The output of fry from Sisson Hatchery, for the years 1907–1908 is as follows:

1907.

Salmon fry	63,697,000
Steelhead trout fry	135,000
Rainbow trout fry	2,003,000
Eastern brook trout fry	826,000
Loch Leven trout fry	268,000
Sunfish	1,000
Rainbow eggs sent to the Philippines	25,000
	66,955,000

1908.

Rainbow trout fry	3,440,000
Eastern brook trout fry	1,780,000
Loch Leven trout fry	540,000
Steelhead trout fry	170,000
Total trout fry	5,930,000
Salmon fry	54,465,000
	60,395,000
Making a grand total for the two years of	127,349,000

In the spring of 1907 it was decided that the California Fish Commission and the Federal Bureau of Fisheries should coöperate in the work of collecting eggs on the Shasta River. A site was selected at the dam of the Siskiyou Electric Power Company, four miles from Yreka, Siskiyou County, as the place was favorable for a good take of eggs whenever there was a normal flow of water in the river, but, like all streams, when there is a flood it makes it difficult to operate a trap. The object of this station was to secure eggs from wild fish to improve the stock of fish in the ponds, both in the Eastern States and at Sisson Hatchery. On account of the season being late and the stream unusually high, only a small lot were taken. Three hundred and seven thousand of the eggs were sent to Eastern hatcheries by the Federal Bureau of Fisheries. In the spring of 1908 Shovel Creek Station of the California Fish Commission, an auxiliary of the Sisson Hatchery since 1890, was opened for the purpose of collecting rainbow trout eggs. This station had not been in operation for several years, as we had as many eggs from the ponds as our time and funds would allow us to collect and distribute. But with the prospects of a distributing car that the last legislature had provided for, we determined to increase our output by operating Shovel Creek Station.

We collected 1,350,000 rainbow eggs. Ten per cent of these were hatched at Shovel Creek Station and distributed in the creek above the hatchery. This was done to keep up the supply of fish in this, one of the finest streams for large spawning fish on the coast. Two hundred and fifty thousand eggs were sent to Germany at the request of the United States Bureau of Fisheries, and the remainder, 965,000, less the loss in eyeing, were shipped to Sisson. We again operated on the Shasta river in the winter and spring of 1908, and collected 836,000 eggs. The percentage of fertilization was small, owing to certain conditions that could not be avoided at the time. The Bureau of Fisheries took their share, 300,000, and shipped them to their different hatcheries on this coast and in the East. Since the distributing car was put in use this summer the fry have been held longer, and consequently they were larger than usual this season. During the latter part of the shipping season the fry averaged from 2½ to 3½ inches in length. This is as large as they can be successfully handled. The car greatly facilitated the work. It carried the fish in better condition than the old way of using dippers and cans, and allowed us to distribute a great many more fish than could have been done under the old system.

We can now increase our pond system and distribute more fry each season, so that every section of the State can be supplied. The pond fish have thrived and furnished the hatcheries with good eggs, cheaper than they could be collected from wild fish. By getting the eggs from the pond fish, we are insured of a never-failing supply of eggs without disturbing the fish in their natural state. The number of fish in the ponds at Sisson Hatchery December 1, 1908, are as follows:

Adult Eastern brook trout	5,300
Two-year-old Eastern brook trout	4,000
Yearlings	2,000
Fry	20,000
Total Eastern brook trout	31,300
Adult rainbow trout	11,150
Two-year-old rainbow trout	6,000
Yearlings	5,000
Fry	50,000
Total rainbow trout	72,150
Adult Loch Leven trout	4,000
Two-year-old Loch Leven trout	1,200
Yearlings	1,000
Fry	15,000
Total Loch Leven trout	21,200
Sunfish	3,000
Eighteen-months-old grayling	900
Adult steelhead trout	200
	10,000
	14,100
A total of all varieties	138,750

We have deposited a larger number of fry in the nurseries this season than usual, as we desire to select from them a strong, healthy stock of breeders. So far we have not heard of any results of the grayling fry distributed in the streams of this county. I have not had the time to make a personal investigation of the streams in which they were planted, but inquiry has failed to find any one who has seen or caught one. Probably we shall find them this coming season. They were planted in streams where they should thrive. Those in the ponds appear to be in good condition, and if we can keep them free from disease until they are old enough to breed, I am of the opinion that we will be able to get them introduced into our mountain streams.

It has been several years since we have had any Eastern brook trout eggs from wild stock, and I think that it would be advisable to get a small shipment from one of the Eastern stations, if the same can be procured, to improve our stock of pond fish. Eggs from wild Eastern trout can be gotten in this State another season, or from some of the lakes in Nevada.

The stock of Loch Leven trout that have been at this station for twelve years past have not degenerated, and those in the ponds appear to be as strong and vigorous now as was the original stock when they were first brought here. Like all other species of trout, they are subject to various diseases, but domestication and artificial food do not appear to change their condition.

The rainbow trout in our ponds are in good condition and show no signs of degeneracy. The only noticeable feature of the rainbow trout that has decended for several generations of pond fish is the increasing brightness in their colors and a changed appearance of their spots. Considerable could be written on this subject, but time and a closer study are necessary before going deeper into it. This is a study that will interest the ichthyologists and will be given more attention from now on.

In closing this brief report on the work of this station I beg to say that the encouragement and advice given to me by your honorable Board and Chief Deputy has greatly assisted me in making the work of this station a success.

Respectfully submitted.

[Signed.] W. H. SHEBLEY,
Superintendent Sisson Hatchery.

SISSON, CAL., September 1, 1910.

Honorable Board of Fish and Game Commissioners for the State of California.

GENTLEMEN: The Superintendent of the Sisson Hatchery submits the following report of the work and operations at Sisson Station for the years 1909-1910, up to September 1st.

The most important work during the last two years has been the construction of a new hatchery building, a cottage for the use of the foreman, a new feed house, wagon shed, a shed over the salmon rearing troughs, new flume and tanks at Shovel Creek Station; the building of a cabin, racks, and trap at Bogus Creek egg-collecting station; the removal of the pond keeper's cottage from the upper to the lower end of the hatchery grounds; the building of a new road and walk from the main hatchery (A) to the county road; the placing of redwood troughs in hatcheries "C" and "D," and the improvement in the pond work and the increase in the number of fish raised during the last two seasons.

After your honorable Board had approved the recommendations mentioned in the report of 1908 for the construction of a new hatchery to take the place of hatchery "A" that had been constructed in 1888, and was in such a state of decay that further attempts to repair it were useless, I submitted a plan of a hatchery 145 feet in length and 42 feet in width, to contain 100 hatching troughs, office, laboratory, also rooms for the men upstairs, storage rooms for tools, apparatus, etc.

Google

The plan of the new hatchery was on entirely new lines, being similar to the plan I made for you two years ago for the Tallac Hatchery; that is, in regard to the arrangements of the troughs. The new system gives each trough a supply of pure water direct from the distributing tank. The troughs are arranged in sections of two each, placed side by side. There is an aisle between each section, and the main aisle or passageway is in the center of the building instead of on the sides, as in the arrangements of the old style of buildings.

The new hatchery was well built, all of the material used in its construction being selected stock. The lumber was selected for its durability and strength. The lumber in the troughs was all selected from heart red fir logs, and will last for years.

The building is well proportioned and on good architectural lines. The work of razing the old hatchery building was begun in the latter part of August, 1909. After the removal of the old building, and the foundation of the new one had been laid, the work was delayed for nearly three weeks on account of the serious illness of a member of the superintendent's family. Owing to the nearness of the dwelling to the hatchery site, the least noise would have been serious.

The rainy season began in the latter part of September, unusually early, and continued until December 1st. The work on the new hatchery was necessarily slow. The interior of the building had to be arranged first, and as much of it finished as possible, so as to have a place to hatch the trout eggs that were coming on during November and December.

During December and January the ground was covered with snow, and when the weather was not blustering and sleeting it was very cold, freezing the lumber whenever it happened to be damp and making it difficult to carry on the work. The men worked patiently under the prevailing conditions and finished the more important part of the work during the latter part of January. The new cottage was constructed during the same time. The old one (pond keeper's cottage) was removed early in the fall to the lower part of the grounds, so that the new one could be erected on the same site. The new cottage is well built, the material being selected for durability. The plan of this cottage was the same as the plan of the superintendent's cottage at the State Game Farm. It has five rooms, laundry, bath, fireplace and other modern conveniences.

We used the troughs taken from the old hatchery, that is, those that were not too much decayed, to make a battery of salmon rearing troughs. The iron roofing from the old hatchery was used to make a shed over these troughs. This battery was built to make more room for the salmon embryos, so as to relieve hatcheries "C" and "D."

Hatchery "A," the new building, will be used exclusively for the hatching and rearing of trout, particularly the eyeing of the eggs will be done in this building, as it can be kept in better condition than the buildings with the old style of boxes.

During the summer and fall of 1909, the troughs in hatcheries "C" and "D," having been made out of soft timber, became very spongy, except a few that were carbonized a couple of years before, and it was deemed best to remove them, as the fry could not be kept healthy in troughs made from such material. I recommended that the troughs be changed and better ones substituted. My recommendation was approved by your honorable Board. After the salmon fry had been released, I tried to get selected lumber from the mills here, but as it was early in the spring there was not any chance to get the material necessary here, and redwood lumber was used.

We built 130 new troughs and put them into hatcheries "C" and "D." Ninety were put into "C" and 40 into "D." The other troughs in "D" were in good order.

In June, 1910, we built a straight road from the entrance to the hatchery grounds to the county road opposite, a distance of 630 feet. A sidewalk was also built of plank running parallel to it for the convenience of pedestrians.

The Sisson Tavern Company removed one of their barns, so that the Commission could build the road and walk straight from the hatchery to the county road. Owing to the uncertainty of getting rainbow eggs from the Shasta River Station, on account of the tremendous floods that came down that stream every spring, I determined to put in a rack and trap in Bogus Creek, four miles north of Thrall, on the line of the Klamath Lake Railroad. I had examined this creek years ago for the purpose of collecting rainbow trout eggs, but, owing to the almost impassable trail that leads down that canyon, I gave the plan up until after the construction of the Klamath Lake Railroad. In January, 1910, I ordered the material for a rack and trap, had it framed at Sisson, and shipped to Bogus Creek, where Mr. A. E. Doney, with the necessary number of assistants, put them in place.

We also put up a small cabin for the men. Mr. Doney successfully handled the trap and other work connected with the station. We secured a lease for the privilege of operating on the creek and land enough for the tanks and cabin. The lease gives the Commission the privilege of operating an egg-collecting station each season for the period of ten years, the station to be closed each season by April 1st.

This is late enough, for the spawning season on the Klamath River and its tributaries is practically over. The work of carrying the eggs from the canyon where the trap is located to the railroad bridge was very hard work. After the eggs were brought to the railroad track they had to be taken on a hand car to Thrall, where they were transferred to the Southern Pacific Railroad, and then taken to Sisson.

The operations at this station were very successful. There were collected 2,000,000 fine rainbow trout eggs. The fertilization was good. Mr. Requa spawned the fish and cared for the eggs en route to Sisson.

Shovel Creek Station furnished 1,100,000 eggs. A larger number of eggs would have been taken, but a rise of water in the creek, which ran over the racks, allowed a great many fish to escape. Ten per cent of the eggs taken at Shovel Creek were hatched there, and the fry distributed in the creek. We took 5,000,000 eggs from the pond fish. This was the largest number of eggs taken from the pond fish since the pond work was begun. These, with the eggs from the Klamath River stations, gave us a total of 8,000,000 rainbow trout eggs for the season. They were hatched in good condition, and the fry show the benefit of the new arrangement of the troughs. Taking them as a whole, they are the finest lot of fish that were ever handled at this station.

The output of salmon fry for the season of 1909–1910 was lighter than it has been for several years past, owing to high water in the rivers and streams tributary to the Sacramento River, on which the United States Bureau of Fisheries stations are located. The high water washed out the racks and a large number of spawning salmon escaped. This caused the take of salmon eggs to be short for this season. We received 22,500,000 as the total take of the season. These were given extra care during the hatching period, and the fry were liberated under the most favorable conditions.

They will give better results than a larger number of eggs would if not handled so systematically. We have built a couple of new ponds in the last two years, making a total of forty-seven ponds and nurseries on the grounds.

The total number of fish on hand in the ponds at Sisson Station September 1, 1910, is as follows:

Rainbow trout:	
Adults	11,000
Two years old	2,000
One year old	8,000
Fry	40,000
Total	61,000

Eastern brook trout:	
Adults	7,000
Two years old	1,000
One year old	3,000
Fry	25,000
Total	36,000

Loch Leven trout:	
Adults	4,500
Two years old	1,300
One year old	8,000
Fry	20,000
Total	33,800
Adult grayling	100
Adult golden rainbow	20
Adult land-locked salmon	25
Adult sunfish	200
Two-year-old steelhead	100
Steelhead fry	10,000
Salmo mykiss fry	10,000
Golden rainbow fry	250
Total	20,695
	157,495

The number of fry distributed during the season of 1909 from Sisson Station is as follows:

Salmon fry	22,500,000
Rainbow trout fry	3,083,500
Eastern brook fry	1,220,000
Loch Leven fry	955,000
Steelhead fry	168,000
Total	27,926,500

The distribution of trout for the season of 1910 will reach about 8,000,000. The work of distribution is going on very successfully. The fry are in excellent condition and carry well. Owing to the drought it will be late in the season before the shipping is over. There is a scarcity of water in a great many streams, and the applicants will have to wait until the rain season begins before the fish can be distributed. It is too early to make any forecast as to the number of eggs expected from the salmon run this fall and winter. It depends on the weather—if sufficient rain should fall before the middle or twentieth of October, we can expect a good take of eggs at the Bureau of Fisheries stations.

The trout fry hatched at Sisson Station this season, of which a number are distributed, is as follows:

Rainbow	5,205,000
Eastern brook	1,000,000
Loch Leven	1,484,000
Steelhead	303,000
Salmo mykiss	150,000
Total	8,142,000
Rainbow eggs hatched at Shovel Creek	120,000
Grand total	8,262,000
Eggs shipped to other stations from Sisson, to be deducted from total—to Brookdale	25,000
Eggs shipped to other stations from Sisson, to be deducted from total—to Wawona	50,000
	75,000

Our next work was to get the seining ground in shape, which was done, and we commenced operations with the seine on the night of April 8th and continued until May 27th, with ranging success. The weather during that period was very favorable for our work. We caught 5,045 trout (males, 2,284; females, 2,761). The males averaged about 1¾ and the females 1½ pounds in weight. Number of females spawned, 2,700, averaging nearly 1,600 eggs to the fish. The total number of eggs taken for the season was 4,115,000. Shipped 400,000 eggs away from the lake—Wawona receiving 250,000, Morrill and Denton, Verdi, Nev., 150,000. The latter was given in exchange for rainbow eggs and Eastern brook trout fry, which were planted in the streams and small lakes in this vicinity. The work of distributing the fry at the different stations was taken up in July and continued until all were planted. Nearly all of the mountain lakes in this vicinity were stocked, and good reports have been received. Received instructions to close the stations as soon as the distribution was over. Glen Alpine was closed August 7th; Tallac, September 24th, and Tahoe on October 10th, so that the necessary improvements could be made at this station (Tahoe Hatchery) before the stormy weather set in. Mr. Matt Green was employed to renew the foundations for hatchery and cottage, and to cover the outside of the buildings with rough rustic and stain the same, and also build new porches. This work was completed on November 8th, and Mr. Green and crew moved to Tallac to build a four-room cottage for the attendants at the Tallac Hatchery. This work was completed during the early winter. I reported in the office at San Francisco, took a vacation, and was ordered to report to Mr. W. H. Shebley, superintendent Sisson Hatchery, which I did, arriving there on December 8th and remained during the winter months.

Season 1910.—Received instructions from your honorable Board on March 10th to start from Sisson for Tahoe to open the stations for the season of 1910; arrived in San Francisco on March 11th and proceeded to Tahoe on March 12th, arriving there on the evening of March 14th. Upon my arrival in Truckee I found that the Lake Tahoe Railway and Transportation Company people had their road open, so it made it much easier to reach the lake than last year. My assistants, Messrs. Anderson, Calkins, West and Shaw, were in Truckee and joined me on the trip. March 15th visited the hatchery, and found everything in good shape and very little snow for this time of year. Crew started for Tallac to place hatchery in order and commence operations with the seine March 16th. Inspected the buildings and found everything in good order, also that Mr. Green had built a very neat cottage for the attendants.

March 17th to 26th: Routine work, getting things in shape at the hatchery and seining ground; also building new bulkhead at the mouth

In the work of construction at Sisson Hatchery, Chief Deputy Vogelsang greatly assisted me in furnishing practical ideas in regard to the color schemes in painting and other valuable suggestions. His untiring zeal has in a great measure helped me to make Sisson Station one of the most successful fish cultural stations in the United States. We are now prepared to carry on successfully the most modern and improved methods of fish cultural work. The kindly appreciation of my work by your honorable Board has been fully realized. It has encouraged me to do my very best for the interests of the Commission and the State.

Respectfully submitted.

W. H. SHEBLEY,
Superintendent Sisson Station.

REPORT OF SUPERINTENDENT TAHOE HATCHERIES.

YEARS 1908-1909.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: I herewith submit by detailed report of the work covering the seasons of 1909 and 1910.

Acting under instructions from your honorable Board, I started for Tahoe on March 5, 1909, to open the stations for the spring and summer work. March 6th arrived in Truckee with my assistants, Messrs. Anderson, Calkins, West, and Shaw. We proceeded to Tahoe City in sleighs, making the trip in seven hours. The road was in very bad shape and we had to walk several miles. Encountered snow from three to twelve feet deep en route.

March 7th I inspected the Tahoe Hatchery and buildings; found everything in good shape.

March 8th I started for Tallac with my crew to complete the interior of the new hatchery that was built during the latter part of the season of 1908, and to place the seining ground in shape to commence operations with the seine. The new hatchery building was erected for the State by Messrs. Lawrence and Comstock of Tallac, and the setting of the troughs and some unfinished outside work was done under contract by Mr. Matt Green. The building is a very substantial one. It is forty feet wide by seventy feet long, with a half pitch roof, and is covered on all sides with shingles, giving it a neat and attractive appearance. It has forty troughs, with hatching capacity for about three million eggs. It is supplied with water from Taylor Creek. A concrete dam was built on Taylor Creek some nine hundred feet from the building. The water is conveyed from that point to the hatchery in an eight-inch iron pipe, which is laid under ground practically all of the way.

of Taylor Creek to facilitate the seining. March 27th commenced operations with seine and continued until May 8th, with grand success. The present season has been the banner season in egg-collecting on Lake Tahoe in the history of the California Fish and Game Commission, as the following results will show: Number of fish caught, 7,250 (males, 2,981; females, 4,342); males averaging nearly 2 pounds and females 1½ pounds. Number of females spawned 4,194, they averaging about 1,500 eggs to the fish. Total number of eggs taken 6,130,000, of which 1,680,000 were shipped to the following State hatcheries: Sisson, 100,000; Wawona, 250,000; Ukiah, 400,000; Marin County, 100,000, and 830,000 exchanged with Morrill and Denton of Verdi, Nev., for Eastern brook trout fingerlings.

Our best spawning day was on May 7th, when we collected 965,000 eggs. We had several days during our spawn collecting seasons that over half million eggs were taken. The number of eggs hatched at the Tahoe stations this season will be about 4,000,000, distributed and hatched as follows: Tallac Hatchery, 2,250,000; Tahoe Hatchery, 1,050,000; Glen Alpine, 700,000; have been distributing fry from the Tallac and Glen Alpine stations for the past week to relieve the crowded condition of the troughs. The work of distribution at all the stations will be taken up in the near future and continued until all of the fry are planted.

Would respectfully recommend at this time that the Tahoe Hatchery have a new floor, head box and set of troughs; also that the water supply be placed in first-class shape and an iron pipe installed to convey same from the springs to the building. This work can be done at the end of the coming season.

Respectfully submitted.

E. W. HUNT,
Superintendent.

Tahoe City.

REPORT OF SUPERINTENDENT OF EEL RIVER HATCHERY.

GRIZZLY BLUFF, July 13, 1909.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report of the steelhead work for the season of 1909. The fish started running earlier this season than usual, making their first appearance in Price Creek on February 16th. The run continued until April 23d. The season was a very satisfactory one, and I took 438,800 eggs. The fry were distributed in Howe, Price, and Williams creeks.

The following is a summary of the work:

Total number of eggs taken	438,800
Total number of eggs eyed	373,000
Loss in hatching and rearing	24,000
Fry distributed—	
Price Creek	168,500
Howe Creek	174,500
Williams Creek	6,000
Total	349,000
Number of fish caught—	
Males	80
Females	107
Number of females spawned	94
Average weight of fish—	
Males	6 pounds
Females	11 pounds
Highest temperature of water	63 degrees
Lowest temperature of water	41 degrees

In conjunction with the work of taking steelhead eggs this season, I have replaced the shake roof on the hatchery with corrugated galvanized iron, as the old roof was in a very shaky condition. This will be a great improvement. I have also built a new settling tank, and replaced the old auxiliary flume with a new one built of redwood. These improvements were much needed ones and have added to the efficiency of the station very much.

Yours very respectfully, W. O. FASSETT.

GRIZZLY BLUFF, June 11, 1910.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report for the season of 1910 on the steelhead work at Eel River Station:

The fish made their first appearance on February 21st, and prospects looked very favorable for a good average take, but lack of water in Price Creek at the time the fish were running caused the main body of the fish to spawn in the river, with the result that my take was very disappointing. However, the 200,000 eggs sent me from the Ukiah Station swelled my total to respectable proportions, and enabled me to distribute a nice lot of fish in this vicinity. The run of females was much larger than the males, and at the end of the season a number of the females had to be released owing to the lack of males.

The eggs received from Ukiah have provided some interesting data, and thinking it may be of interest I am including it in my report. The eggs were taken by Mr. La Motte on the 11th day of April and were received by me on the 28th of the same month. Upon being placed in the water several hundred hatched, although they were only seventeen days old. I placed all these alevins by themselves in a separate trough, and preserved specimens of them, and also of the others which hatched on the 3d of May, seven days later, and continued preserving specimens of each lot at intervals of a week until they were distributed. In comparing the advancement, the prematurely hatched alevins matured the same as those hatched a week later, and with no greater loss, and no apparent difference; the average temperature of the water during this period was 61 degrees.

Eel River at present is simply alive with young salmon about 3½ inches long, and their jumping out of the water all along the river is best illustrated by the heavy fall of rain drops on the river's surface. In the small creeks young steelheads about 1¼ inches long can be seen in countless numbers. All in all, every indication points to a still greater increase of fish in Eel River.

During the time I have been engaged in the steelhead work I have, with your approval, replaced eleven sections of old troughs, which have been in use twelve years, and am now engaged in replacing the platform and making other necessary repairs at the dam. After regrading the main flume where it has settled in places, and moving it in closer to the bank where it runs along the bluff, this station will again be in first-class condition.

The following is a summary of the season's work:

Total number of eggs taken	172,000	
Total number of eggs eyed	154,800	
Loss in hatching and rearing	17,000	
Eggs received from Ukiah Hatchery	200.000	
Loss in hatching and rearing	20,000	
Fry distributed—		
Price Creek	167,400	
Howe Creek	163,400	
Sweasy's Lake	4,000	
Total	334,800	
Number of fish caught—		
Males	32	
Females	65	
Number of females spawned	47	
Average weight of fish—		
Males	4	pounds
Females	6⅓	pounds
Lowest temperature of water	44	degrees
Highest temperature of water	70	degrees

Yours very respectfully,

W. O. FASSETT.

GRIZZLY BLUFF, June 13, 1909.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report of the salmon hatch at this station for the season commencing December 7, 1908, and ending March 6, 1909. The eggs arrived in four shipments, as follows: December 7th, 1,000,000; December 27th, 1,500,000; January 5, 1909, 1,500,000 from

Mill Creek, and December 21st, 1,440,000 from Battle Creek, making a total of 5,440,000 salmon eggs received. The hatch was successful, and I planted in Eel River and Price Creek 5,374,200 good healthy fry.

The following is a summary of the work:

Eggs received	5,440,000
Eggs lost	49,600
Fry lost	16,200
Fry distributed	5,374,200

On the 17th of February, 1909, I received 52,500 silver salmon eggs from the Santa Cruz Hatchery. The eggs arrived in fair condition, with a loss of 1,800 en route. The subsequent loss of eggs to the time of hatching was 4,000, making a total loss of 5,800. There was practically no loss in rearing, so I distributed 46,700 fry. All of them were planted in Price Creek.

The following is a summary of the hatch:

Eggs received	52,500
Eggs lost	5,800
Fry distributed	46,700

Yours very respectfully,

W. O. FASSETT.

GRIZZLY BLUFF, June 11, 1910.

To the Honorable the Board of Fish and Game Commissioners.

GENTLEMEN: The following is my report of the salmon hatch at this station for the season commencing December 5, 1909, and ending March 23, 1910. The total number of eggs received was 6,000,000, and were received in four shipments, as follows: December 5th, 1,471,000; December 26th, 1,438,500; December 31, 1909, 1,541,000, and January 10, 1910, 1,549,500. The eggs were all shipped from Mill Creek and were as near perfect as possible, the loss being practically nothing. The hatch was most successful, and the fry were distributed in Price Creek and Eel River.

The following is a summary of the work:

Eggs received	6,000,000
Eggs lost	30,255
Fry lost	practically none
Fry distributed	5,969,745

Yours very respectfully,

W. O. FASSETT.

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION.

In Fiscal Year 1907-1908.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$5,441 00		$325 00	$5,766 00
Alpine	60 00			60 00
Amador	1,079 00			1,079 00
Butte	2,325 00		50 00	2,375 00
Calaveras	972 00			972 00
Colusa	1,364 00			1,364 00
Contra Costa	1,560 00		100 00	1,660 00
Del Norte	322 00			322 00
El Dorado	1,062 00		25 00	1,087 00
Fresno	3,693 00		25 00	3,718 00
Glenn	698 00			698 00
Humboldt	2,818 00		25 00	2,843 00
Imperial	559 00			559 00
Inyo	806 00	$110 00		916 00
Kern	2,070 00		25 00	2,095 00
Kings	1,000 00	10 00		1,010 00
Lake	1,192 00		25 00	1,217 00
Lassen	444 00	80 00		524 00
Los Angeles	12,140 00	180 00	225 00	12,545 00
Madera	720 00		25 00	745 00
Marin	749 00	40 00	150.00	939 00
Mariposa	385 00	10 00		395 00
Mendocino (county clerk failed to act in this year).				
Merced	1,305 00	20 00	50 00	1,375 00
Modoc	450 00			450 00
Mono	184 00	10 00		194 00
Monterey	1,897 00	40 00		1,937 00
Napa	1,362 00		50 00	1,412 00
Nevada	1,260 00			1,260 00
Orange	1,946 00			1,946 00
Placer	1,523 00	10 00	50 00	1,583 00
Plumas	605 00	40 00		645 00
Riverside	2,342 00	10 00	125 00	2,477 00
Sacramento	3,581 00	20 00	250 00	3,851 00
San Benito	727 00	10 00		737 00
San Bernardino	3,304 00	10 00		3,314 00
San Diego	2,950 00	20 00	50 00	3,020 00
San Francisco	1,870 00		250 00	2,120 00
San Francisco (commission)	12,201 00	80 00	950 00	13,231 00
San Joaquin	2,750 00	10 00	25 00	2,785 00
San Luis Obispo	1,498 00	10 00	25 00	1,533 00
San Mateo	1,363 00		150 00	1,513 00
Santa Barbara	1,768 00	30 00	75 00	1,873 00
Santa Clara	3,805 00		50 00	3,855 00
Santa Cruz	2,020 00		25 00	2,045 00
Shasta	1,970 00		150 00	2,120 00
Sierra	321 00			321 00
Siskiyou	2,716 00	40 00	125 00	2,881 00
Solano	1,982 00	10 00	50 00	2,042 00
Sonoma	3,980 00		50 00	4,030 00
Stanislaus	1,112 00		50 00	1,162 00
Sutter	578 00	10 00		588 00
Tehama	1,180 00			1,180 00
Trinity	512 00	10 00		522 00
Tulare	2,380 00	70 00	75 00	2,525 00
Tuolumne	992 00		100 00	1,092 00
Ventura	1,509 00	30 00	25 00	1,564 00
Yolo	1,429 00		25 00	1,454 00
Yuba	901 00			901 00
Totals	$113,732 00	$920 00	$3,775 00	$118,427 00

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION—Continued.

In Fiscal Year 1908–1909.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$4,184 00		$175 00	$4,359 00
Alpine	60 00			60 00
Amador	880 00			880 00
Butte	2,394 00	$20 00		2,414 00
Calaveras	736 00			736 00
Colusa	1,208 00			1,208 00
Contra Costa	1,288 00			1,288 00
Del Norte	369 00			369 00
El Dorado	947 00			947 00
Fresno	3,502 00	30 00	125 00	3,657 00
Glenn	672 00			672 00
Humboldt	2,550 00	20 00	25 00	2,595 00
Imperial	499 00	10 00		509 00
Inyo	816 00	100 00		916 00
Kern	2,511 00	10 00		2,521 00
Kings	950 00			950 00
Lake	929 00			929 00
Lassen	421 00	20 00		441 00
Los Angeles	12,055 00	70 00	100 00	12,225 00
Madera	619 00			619 00
Marin	800 00	30 00	75 00	905 00
Mariposa	340 00	20 00		360 00
Mendocino	832 00			832 00
Merced	1,341 00		150 00	1,491 00
Modoc	413 00			413 00
Mono	171 00	10 00		181 00
Monterey	1,958 00	10 00		1,968 00
Napa	1,398 00		25 00	1,423 00
Nevada	1,524 00			1,524 00
Orange	1,797 00		25 00	1,822 00
Placer	1,509 00		25 00	1,534 00
Plumas	608 00	10 00		618 00
Riverside	2,268 00	30 00	150 00	2,448 00
Sacramento	3,355 00	10 00	150 00	3,515 00
San Benito	798 00			798 00
San Bernardino	3,061 00	10 00		3,071 00
San Diego	2,854 00	50 00	25 00	2,929 00
San Francisco (county clerk)	1,202 00		50 00	1,252 00
San Francisco (commission)	13,822 00	170 00	775 00	14,767 00
San Joaquin	3,025 00		25 00	3,050 00
San Luis Obispo	1,528 00		25 00	1,553 00
San Mateo	1,299 00			1,299 00
Santa Barbara	1,701 00	20 00	75 00	1,796 00
Santa Clara	3,193 00			3,193 00
Santa Cruz	1,967 00	10 00	50 00	2,027 00
Shasta	2,083 00			2,083 00
Sierra	239 00			239 00
Siskiyou	2,578 00	20 00	150 00	2,748 00
Solano	1,873 00		75 00	1,948 00
Sonoma	3,967 00	10 00	50 00	4,027 00
Stanislaus	1,182 00			1,182 00
Sutter	540 00			540 00
Tehama	1,151 00	10 00		1,161 00
Trinity	506 00			506 00
Tulare	2,578 00		125 00	2,703 00
Tuolumne	1,027 00		25 00	1,052 00
Ventura	1,452 00	10 00		1,462 00
Yolo	1,383 00		25 00	1,408 00
Yuba	832 00			832 00
Totals	$111,740 00	$710 00	$2,500 00	$114,950 00

HUNTING LICENSE SALES BY COUNTIES AND FISH AND GAME COMMISSION—Continued.

In Fiscal Year 1909–1910.

Name of county.	At $1.00. Amount.	At $10.00. Amount.	At $25.00. Amount.	Total.
Alameda	$5,614 00	$10 00	$100 00	$5,724 00
Alpine	36 00			36 00
Amador	920 00		25 00	945 00
Butte	2,394 00		25 00	2,419 00
Calaveras	734 00			734 00
Colusa	1,270 00			1,270 00
Contra Costa	1,246 00		50 00	1,296 00
Del Norte	312 00			312 00
El Dorado	864 00			864 00
Fresno	4,059 00	10 00	125 00	4,194 00
Glenn	746 00		50 00	796 00
Humboldt	3,056 00			3,056 00
Imperial	445 00			445 00
Inyo	1,025 00	30 00		1,055 00
Kern	3,550 00			3,550 00
Kings	1,233 00			1,233 00
Lake	1,028 00			1,028 00
Lassen	468 00		50 00	518 00
Los Angeles	12,779 00	80 00	250 00	13,109 00
Madera	783 00	10 00		793 00
Marin	718 00	20 00	25 00	763 00
Mariposa	325 00			325 00
Mendocino	1,301 00	10 00	25 00	1,336 00
Merced	1,470 00	10 00	50 00	1,530 00
Modoc	406 00			406 00
Mono	185 00	50 00		235 00
Monterey	2,219 00	20 00		2,239 00
Napa	1,725 00		300 00	2,025 00
Nevada	1,581 00	20 00		1,601 00
Orange	2,200 00			2,200 00
Placer	1,686 00		100 00	1,786 00
Plumas	448 00	10 00		458 00
Riverside	3,227 00	20 00	100 00	3,347 00
Sacramento	3,418 00	20 00	150 00	3,588 00
San Benito	1,050 00	10 00		1,060 00
San Bernardino	3,594 00		25 00	3,619 00
San Diego	3,349 00	30 00	75 00	3,454 00
San Francisco	915 00		100 00	1,015 00
San Francisco (commission)	15,971 00	200 00	1,050 00	17,221 00
San Joaquin	3,220 00		25 00	3,245 00
San Luis Obispo	1,341 00			1,341 00
San Mateo	1,409 00		25 00	1,524 00
Santa Barbara	1,708 00	50 00	50 00	1,808 00
Santa Clara	3,487 00		125 00	3,612 00
Santa Cruz	1,970 00	10 00	50 00	2,030 00
Shasta	2,098 00	40 00	25 00	2,163 00
Sierra	164 00			164 00
Siskiyou	2,728 00	40 00	75 00	2,843 00
Solano	1,522 00		75 00	1,597 00
Sonoma	4,340 00		50 00	4,390 00
Stanislaus	1,415 00			1,415 00
Sutter	631 00			631 00
Tehama	1,115 00	20 00		1,135 00
Trinity	616 00			616 00
Tulare	2,923 00		75 00	2,998 00
Tuolumne	986 00		50 00	1,036 00
Ventura	1,782 00	30 00	50 00	1,862 00
Yolo	1,450 00		50 00	1,500 00
Yuba	960 00			960 00
Totals	$124,210 00	$750 00	$3,400 00	$128,450 00

NOTES ON THE STRIPED BASS IN CALIFORNIA.

By N. B. Scofield.

The striped bass is to be found in the San Francisco Bay region or in the lower Sacramento or San Joaquin rivers, in varying numbers, in any month of the year. In the lower rivers, however, more of them are caught in the spring and autumn.

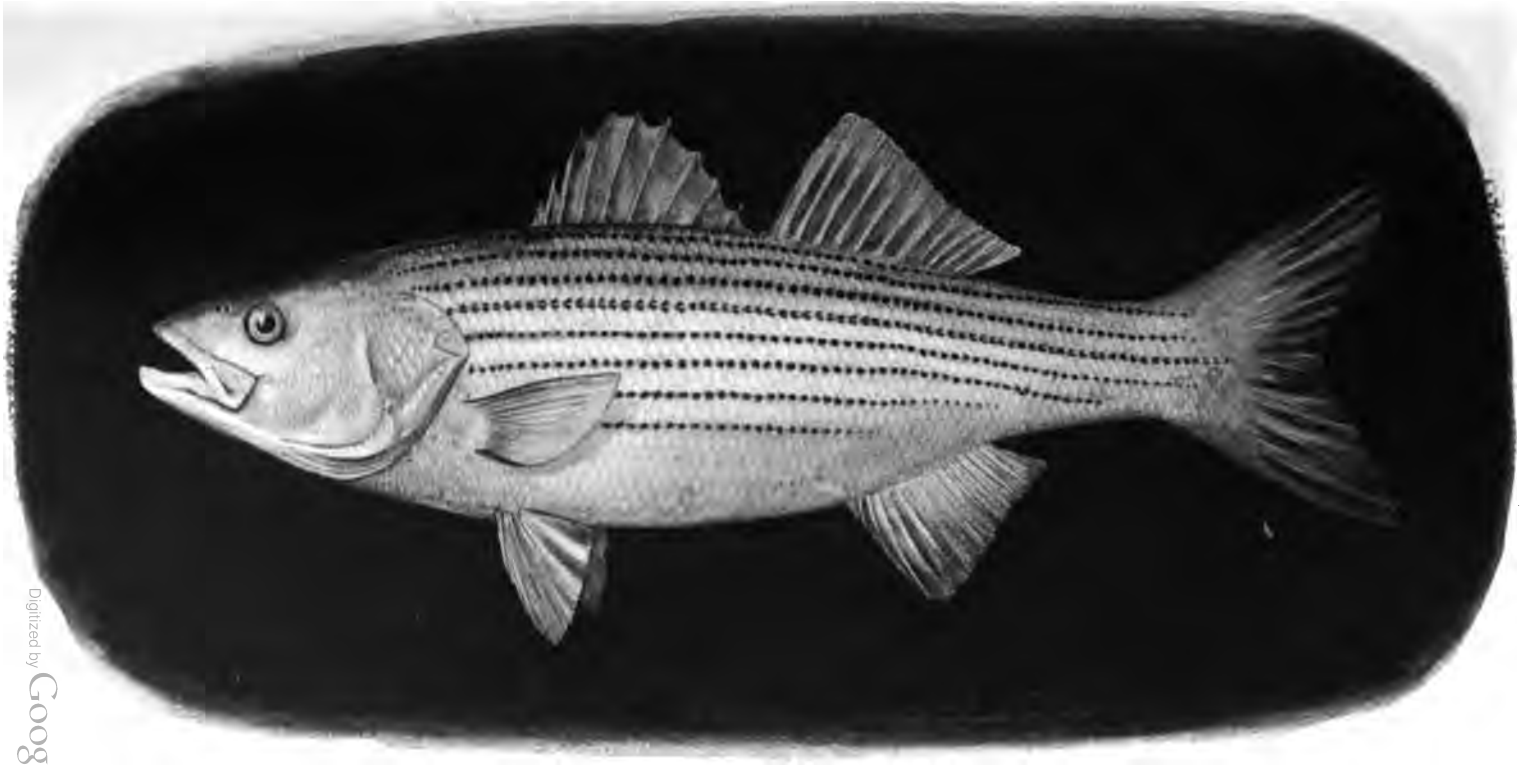
The spring run, as it is termed, is mostly of mature or "spawn bass," evidently ascending the rivers to spawn, and takes place during April, May and June. The average weight of these fish is between twelve and fifteen pounds. Thirty-pound fish are common and occassionally fifty and sixty-pound fish are taken.

The fall run on the rivers commences usually in September, the time being somewhat variable, and lasts from two weeks to two months. The fish of this run are smaller; immature bass, not often over five or six pounds, and according to the fishermen are bright, fresh run fish. The small sized bass are more apt to be found in schools, and the large catches in seine or gill net are usually of this size. In the lower bays they are often found on the flats voraciously feeding on schools of "sardines," making a sucking noise similar to that of the carp when feeding at the surface of the water. Often a school of these bass will run into one of the numerous tule lined sloughs of the Sacramento and San Joaquin delta, evidently attracted by the small river fish, which they drive before them, feeding as they go. Such schools are often indicated by a large number of shags, gulls, and fishing birds, which take this advantage to feed upon the maimed and frightened fish. Occasionally a fisherman is lucky enough to find one of these schools and will catch all his boat will hold.

The striped bass seems to be quite notional. It will suddenly appear on the river drifts and as suddenly disappear again, and no trace of them can be found. The fishermen who have now had fifteen or twenty years of experience fishing for them in these waters still trust mostly to chance in locating them, not being able to figure out their movements other than that rough water spoils the fishing, the theory being that they leave the flats and sloughs in rough weather and take to the deeper parts of the river where the nets do not reach them.

These bass are known to the river fishermen as winter bass. They ascend practically all of the sloughs at the mouths of streams, and run up the streams themselves.

The spring run. The San Joaquin River has been usually selected by this run, and they are taken by the fishermen in gill nets between Antioch and Bouldin Island. By far the largest portion of the spawn bass are taken near Bouldin Island. The fish are seldom taken above this point during the spawning season, but after spawning they ascend



STRIPED BASS (Roccos lineatus)

the rivers for long distances, or enter the sloughs or flooded lands in search of food, for after spawning they again become voracious feeders.

In the years 1903, 1904, and 1905 spawn bass were so plentiful about Bouldin Island that the fishermen, in order not to glut the market, agreed among themselves to catch no more than 600 pounds to the boat each twenty-four hours. They frequently got more than double this amount at one drift of a gill net.

Many of these fish were with mature eggs, and the fishermen all testify that the bottoms of their fish lockers were covered with eggs. Although bass with mature eggs may be found between December and June, almost all are found between the middle of April and the last of May. When the question of artificially hatching the striped bass came up, and a desirable place for a hatchery was looked for, Bouldin Island seemed the only logical place. A hatchery was built here in 1907, equipped with McDonald hatching jars and apparatus for getting the necessary water from the river. Before the hatchery was completed in April, many bass were being caught by the fishermen. The hatchery depended on the fishermen for any ripe eggs they might take. The fishermen took a lively interest and assisted in every way. Soon the capacity of the hatchery was taxed. At one time one fishing boat in one drift took eight female bass with eggs running freely, but there was room in the hatchery for the eggs of four of them only. From many lots of eggs no fish hatched. Other lots hatched 5 per cent only, and from that up to 50 and 60 per cent. One lot hatched a very high percentage of the eggs.

The results of the season's work were very encouraging, for hatching striped bass was still in the experimental stage, and the results in number of eggs hatched during this season of 1907 were much better than had been obtained on the Atlantic coast. It was not determined just why so many eggs failed to hatch, but it was laid to unsuitable water or some defect in hatchery method. The run of bass, while not up to the average, had been very satisfactory.

The season of 1908 found the hatchery better prepared for work and equipped with microscopes and apparatus for determining the cause of the failure of so many eggs to hatch. The run of bass was almost a failure, and the take of eggs so small that many of the experiments came to nothing for lack of eggs to experiment with.

It was soon found that the first cleavage of the germinal disc in the developing egg takes place about two hours after fertilization. So with the microscope it was possible to tell within two hours after the eggs were taken just what per cent was fertilized and developing. It was found that the loss of eggs was not due to bad water or any defective method of handling the eggs in the hatchery, but due to the nonfertilization of the eggs.

Where 40 per cent or more of the eggs from one fish were fertilized, they could be hatched without much difficulty. When there was a lower per cent of fertilization the unfertilized eggs became fungus infected, and between the twelfth and twenty-fourth hour after taking they became lighter than the water and rose and floated out of the jar with the current, no matter how slight this current was. These unfertilized eggs became attached to each other and to the live and developing eggs, and when they floated out of the jar they took many live eggs with them. In jars where there was only 10 per cent or 15 per cent of fertilized eggs, all might be lost in this way.

The milt of the male in nearly all cases showed active spermatazoa, thus narrowing the trouble down to the egg or the method of fertilization. Both the wet and the dry methods of fertilization were used, with no very appreciable difference. What difference there was, was in favor of the wet method. Frequently a lot of eggs were taken which did not swell properly in the water, showing they were immature.

Most of the lots of eggs taken were a pale green color, but a few lots had a golden green color. The golden shade is caused by a pigment in the germinal disc. It is probable that the eggs are not mature until this pigment is formed, but some lots hatched a small per cent of fish where the pigment did not show, and some with the pigment very noticeable hatched no fish. The better lots of eggs showed the pigment. We reached the conclusion that the trouble had been the eggs of the fish taken were slightly immature and incapable of fertilization.

We found that with the use of copper sulphate (1 part copper sulphate to 100,000 parts of water) it was possible to hatch lots where there was only 5 per cent of good eggs. The fungus growth on the outside of the bad eggs was killed and the good eggs would not adhere to them. A rather strong current could be turned on and the good eggs would remain in the jar and the bad ones would mostly pass out. The fish hatched from these eggs were just as strong as those hatched at the same time without copper sulphate. The young fish after hatching are able to stand this strength of copper sulphate. The yolk sac is absorbed seven days after hatching.

The run of bass at Bouldin Island during this season was very light. Most of the fish taken by the fishermen were quite green, and by the middle of May they caught both green fish and fish that had already spawned. The taking of a female bass with ripe eggs was evidently a lucky chance, and we had not been able to locate their spawning place.

A gauze tow net was used at different times during the season in the river, the sloughs, the flooded islands, and on the tule flats in the hope of catching a young bass just hatched, or eggs before hatching, and thus get some clue to where the striped bass spawns, but without results.

Season of 1909.—Having formed the theory that the striped bass caught at Bouldin Island are almost all sexually immature, and having so far been unable to locate their spawning beds, we hope that by penning the fish when caught they could be held until ripe. The penning of striped bass had been tried on the Atlantic coast without success and we knew they were exceedingly difficult to hold alive in captivity, yet we believed that with a sufficiently large pen, fenced off in the river, they could be held. By act of the State legislature the months of May and June had been made a close season on striped bass for net fishermen. We employed a fisherman with boat and suitable nets to fish during this time for the hatchery.

The run of spawn bass this season was exceedingly poor. Very few of the fish were to be found near Bouldin Island or on the river below. While ripe males were not uncommon, the females taken were most of them sexually immature. Only one apparently ripe female was taken, and from this fish only about 5 per cent of the eggs were hatched. The capture in the river of only green or spawned out fish would indicate that the river is not the place of spawning; but every conceivable place was fished during both the day and the night—the tule flats, the sloughs, the interior of the flooded island were fished with the result we were not nearer to the solution of the problem of where the striped bass spawn.

We built one pen in the edge of the river 3 by 40 feet in which the water stood about 6 feet deep at the outer edge and 2 feet deep at the inner side next the bank, with tules growing at one end and the rest partly overhung with willows.

We found that immature female bass and mature male bass caught in gill nets and carefully handled and placed in lively condition in this pen would live five or six days. The same kind of fish caught in fyke nets would live ten or twelve days. Female bass apparently nearly in spawning condition caught in gill nets could not be kept twenty-four hours. They injure themselves in some way when caught in the net and do not recover. We caught no nearly ripe females in the fyke net. Thinking possibly there was not current enough in the pen we had, we built a pen 16 by 20 feet by 5 feet deep, divided into two compartments 10 by 16 feet each. The framework was of 2 by 4 pine, and the sides and bottom covered with woven wire fencing. The pen was floated and anchored in the current of Potato Slough. The fish placed in this pen did not live as long as in the other. The current seemed to be too strong for them. In neither pen did they struggle to get out, but seemed not to recover from their struggles when caught. In all fifty bass were penned. Our experience would show that the striped bass can not be held in pens until they mature unless possibly the pen be made very large and so placed that the fish can be trapped and guided into the pen without handling.

There were several theories advanced to account for the poor run of bass in the San Joaquin River. For a year the dredgers had been active building up the levees and the silt and dirt thus stirred up might cause the bass to shun the river. Another theory was that the bass turned into and continued on through the flooded Sherman Island, whose levees had broken the year before, and continued up the Sacramento. The number of bass taken in the Sacramento was larger than the spring before, which seems to bear out this theory.

Another theory is that the bass are becoming scarce, due to the large catches and to the destruction of bass in the reclaimed islands when they were pumped dry. The scarcity of the bass in the San Joaquin may be due to all of these causes. Certainly immense numbers of bass have been destroyed in the islands. When the levees break the small river fish and carp enter the flooded lands and the bass also seem to prefer these islands for feeding grounds; and when the levees are built up again and the water pumped out, many tons of bass of all sizes are left.

The fishermen say that the sand bars and flats in the San Joaquin, which used to be of clean sand, are now covered with silt and trash stirred up by the dredgers, and they catch no bass now on these bars, where formerly they were often taken.

Most of the bass taken at Bouldin Island this season were taken in Georgiana Slough on their way through to the Sacramento. The catch on the Sacramento was larger than the year before, the largest number being taken in Steamboat Slough. The run was quite good in Cache Slough and Prospect Slough.

Season of 1910.—During this season two fishermen and boat were employed to fish for striped bass in the neighborhood of Bouldin Island, and another boat and two fishermen were employed to fish in Cache Slough and tributaries on the Sacramento side.

The run of spawn bass on the San Joaquin was better than the previous season, but all females taken were green and immature. Ripe males were taken in plenty. The river above Bouldin and all sloughs within ten miles were fished, the fishing being done mostly by night. The Mokelumne River was also explored. Bass were taken only near Bouldin Island mostly in the main river.

The Cache Slough country on the Sacramento was thoroughly explored. The striped bass are found in increasing numbers each year in this region. The greater number of bass are taken in Steamboat Slough, just above the mouth of Cache Slough, during the early part of the runs. Later they are found more plentiful in Cache Slough, where they are taken in nets in the main slough. Most of the bass running up Cache Slough turn off and ascend the clear water of Prospect Slough, through which they can reach the Big Lake, back of Clarksburg, and from there through inlets into the Sacramento again above the city of Sacramento. These sloughs and the Big Lake were pretty thoroughly fished during the bass run. Almost all the striped bass taken were very green and apparently not within several weeks of their spawning time. According to those familiar with the region, the striped bass come into Prospect Slough late in May and in June—a sort of belated run—and spawn in the main slough, but this season this run did not appear. The run here was earlier this season than last and evidently continued on up the river. They were reported as being seen early in May as far up as Tehama.

In the clear water of Prospect Slough the bass take the spoon readily, and this has become a popular fishing ground for those who enjoy the sport of catching the striped bass with rod and reel. The usual method is to troll behind a gasoline launch. Large numbers were taken this season in this manner; probably more pounds of fish than were taken by nets in Cache Slough.

If any future effort is to be made at hatching the striped bass, Cache Slough and its tributary, Prospect Slough, offer exceptional opportunities of trapping and impounding the bass in their early run up these sloughs. Prospect Slough is much of it narrow and not so deep, but that impounding nets could be set for catching them on their way up the slough. There should be no great difficulty in trapping the bass and leading them into an inclosure or blind slough, of which there are several, for they are readily caught in the small winged fyke nets used by the "cat" fishermen. The shallow Big Lake would be an excellent place for setting impounding nets. If the bass can be impounded and not be handled, as is necessary with seines and gill nets, they ought to reach the spawning stage in confinement.

N. B. SCOFIELD.

NOTES ON SPAWNING AND HATCHING OF STRIPED BASS EGGS AT BOULDIN ISLAND HATCHERY.

By N. B. Scofield and G. A. Coleman.

Examination of Lot "A," April 28, 1908, 6.30 p. m. to 9.00 p. m.

Both female and male had been caught about two hours and were dead when eggs were taken. Eggs taken at wharf at 6.30 p. m., spawned in a new dry tin pan, the milt spurted over them, then carried to the hatchery (about thirty seconds in transportation), about a pint of filtered river water added, and the eggs gently agitated by tipping pan for about one minute, more water added, and the milt decanted.

The milt from male was examined within five minutes after taking, but no movement of the spermatozoa was perceptible. The milt had a ropy, thick, white appearance, did not mix with water, but sank to bottom when put in clear water or normal salt solution. Eggs were taken from this lot, and milt, which had been caught in a vial of normal salt solution, added; the washing was done in distilled water, and they were placed in distilled water to swell, but did not swell at all.

April 29.—Eggs were taken at intervals and examined under the microscope, but no sign of segmentation could be found. Eggs were examined under high power of microscope for bacteria and fungus, but none could be distinguished. The eggs are constantly turning while floating to the top of jar and going over; an examination of these eggs shows that the germinal disc was broken or pinched off, and in some cases the yolk was ruptured. At 6.30 p. m. (twenty-four hours), fully 50 per cent of the eggs had passed off this way.

April 30, 7.00 a. m.—An examination of the jars showed that very few eggs were left, and these showed no signs of segmentation, hence jars were emptied. Specimens in mould dish were examined at 9.00 a. m. for bacteria and fungus, but none found. Examined again at 4.00 p. m., when it was found the bacteria (*Bacterium terms*) had developed in countless numbers. A distinct odor of putrid fish was discerned on opening dish.

4.00 p. m.—A number of males and females were examined on wharf, but no ripe ones found. Milt from these males showed no movements under microscope in three to five minutes.

LOT "B," APRIL 30, 7.00 P. M.

This lot of eggs was from a female which had been dead about one hour, and male had been dead about the same length of time. Both eggs and milt were taken at wharf. Eggs taken in a new dry tin pan. The milt expressed directly over them. The pan dipped immediately (in about fifteen minutes) into river from side of boat. They were in this water with the milt while carried to the hatchery (about three minutes), and washed in water from overflow taken in the hatchery. Allowed to swell one hour before beginning to put in jars. The last of them remained in pan 2½ hours. About 25 per cent of this lot turned white before they were put in jars. A study of these eggs showed that no impregnation took place, just as in lot "A." The eggs swell, the germinal disc contracts and forms a cap on one side of the yolk. This cap remains in position up to about twelve hours, when it pinches off. The egg turns a whitish color, becomes buoyant and floats off through the siphon tube. A part of the eggs in this lot were taken in normal salt solution and milt, which was caught in normal salt solution applied. Specimens from these were preserved, and a study of them shows that they acted in just the same way as the others.

Lot "C."

Tried the experiment of taking some of this lot of eggs without milt and swelling them, placing them in a jar under same conditions as the impregnated eggs. They developed exactly as lots "A" and "B," and the germinal disc pinched off in just the same way. This is practical proof that the eggs will develop to this stage without impregnation, and also that impregnation did not occur in lots "A" and "B."

Lot "C," May 6.

Male and female alive and in prime condition. The dry method was followed. The self-straining bucket was used. This consists of a cylinder of perforated tin, fitting inside the regular collecting bucket, barring a space of two inches between tin and side of bucket. Water is poured over the eggs, and the movement of cylinder in the bucket strains off the milt. The first segmentation occurred in two hours, and it was estimated that 30 per cent of them would develop embryos, and 25 per cent of them did develop into fish. There was about 50 per cent died after developing into embryos, thought to be smothered from lack of circulation of water, due to collection of sediment on sides of jar.

The non-fertile and unimpregnated eggs passed over within twenty-four hours, just as in the first lots "A" and "B." A part of these eggs was saved and left in the jar to watch development of fungus and bacteria.

May 8.—The first trace of fungus was found on the dead eggs in the above jar within forty-eight hours after taking; specimens were removed to mould for study.

May 9.—The fungus consists of two species. One has the appearance of saprolegnia, the other a segmented form of a higher order, and both are in fruiting stage, showing that they develop very rapidly. So far no trace of the fungus on live eggs. In the case of the ripe eggs taken from spawned female, a small percentage of fertilization was obtained in a normal salt solution after eggs had been taken three hours.

Lot "D."

May 24.—Eggs from two females taken by McLeod. Milt from buck taken by McLeod at same time. Wet method employed by McLeod. Brought into hatchery half an hour after taking, with milt still on. Washed up in hatchery in four dish pans about 1,000,000 eggs. Apparently 30 per cent of segmentation at two hours. Apparently 25 per cent had turned white.

May 25.—Eggs disturbed at twenty-four hours by Ball, condensing the good eggs into three jars and pouring off bad ones.

May 26.—Do not seem to have suffered by handling.

May.—Twenty-five per cent of this lot hatched into fish.

LOT "E."

May 24, 8.00 p. m.—Eggs taken by McCrea from female which he thought was ripe. Milt from buck which he said was in prime condition. Dry method employed. Brought to laboratory in spawning pan. Was very white with milt which was stringy (not ripe). Washed up in hatchery. At two hours, about 1 per cent segmentation. Put in jars and kept twenty-four hours.

May 25.—No sign of embryos; hence thrown away.

LOT "F."

May 24, 9.00 p. m.—Eggs from spawned out female taken by "Nibsey," about 3 miles above Bouldin. Milt from male taken at same time. Wet method employed by Ball. Female had been very roughly handled in taking from net, but eggs had ripe appearance. Eggs taken in 3 gallons of water (about 20,000). Milt added and left for one hour; at two hours—50 per cent segmentation.

May 26.—About 50 per cent ready to hatch. Used for experiments with copper sulphate.

LOT "G."

May 25.—Eggs from a "spawned" female. Milt from buck taken half an hour later (not ripe). Wet method employed by McLaughlin. Brought into hatchery in self-straining bucket. In two hours about 50 per cent fertilization. Put in open jar.

LOT "H."

May 25.—Eggs from female taken by Woods. Milt from buck taken by Woods. Female in good condition and eggs apparently ripe. Male small and milt green (stringy). Wet method employed by Cassell. At two hours about 25 per cent fertilization; hence were not put in jars.

LOT "I."

May 28.—Female and male taken by McLeod. Eggs apparently ripe. Milt not very good. On questioning them closely, found they had taken the female from net, expressed the eggs in pan dry, added a little water to keep them moist and kept them in the water until they got a buck (about fifteen minutes), then added the milt. The eggs thus had time to begin swelling before milt was added. At two hours about 5 per cent of fertilization.

LOT "J."

May 28.—Female and male caught by Herman Wredt, about 3 miles up river from Bouldin. Said they were both ripe. Wet method employed. Eggs kept in gasoline can for two hours. Washed up in hatchery. Developed 25 per cent of fertilized eggs.

LOT "K." THE BANNER LOT.

May 28.—Female and male taken by Woods. Both in prime condition. (Eggs and milt ran freely.) Eggs a golden green color when taken. Milt white, but ran out like cream. Eggs taken in spawning pan, a little water added, and a *very small quantity* of milt added. The water was changed frequently in transporting eggs, as they were carried in boat for five hours. These eggs were taken in Disappointment Slough, some 14 miles from hatchery, and in the night-time. He had no bucket in which to place the eggs, so transferred them from spawning pan to a stew kettle, which he happened to have. In working with their engine, he would let eggs go for an hour or more at a time without washing. It was between five and six hours from the time eggs were taken to time they reached the hatchery. He washed them on arriving at his ark, and when they were brought into hatchery not a particle of milt could be seen on them, and there were very few dead eggs. All had a clear greenish color. There appeared to be 85 per cent of them fertilized when they were brought in.

May 30.—There were actually hatched from this lot out of 280,000, 227,000 fry, or 71 per cent, and this number planted in shallow water about 3 miles above Bouldin.

LOT "L."

May 28.—Male and female taken by "Nibsey." Spawning and fertilization attended to by Grey. He thought these eggs ripe, but sample brought to the laboratory showed very dark green with white spots. He said fish were very roughly handled in taking from the net. In two hours about 5 per cent fertilization. Put up and kept twelve hours (no good eggs).

May 29.—Male and female taken by Woods. Eggs and milt taken by McLaughlin. Found a few eggs (about half pint) left in female when she was brought in by Woods. They were a light yellowish green, ran freely, and separated easily in water. The milt was examined and found to be not very lively; it came out in thick lumps. Wet method used. Eggs brought to hatchery in thirty minutes after taking. Washed in laboratory. Developed 50 per cent of fertilized eggs.

GENERAL CONDITIONS, TEMPERATURE OF WATER, ETC.

On Saturday and Sunday it was warmer than at any time this spring, bringing the water up to 66 degrees or 68, which brought a fair run of bass on Sunday afternoon and with varying luck during the week. The north wind seemed to stop the catching of bass, though a few other fish were caught. The sudden drop of the temperature on Thursday night, combined with a northwest wind, stopped the bass entirely, so that the first drift on Sunday, May 31st, yielded only one or two very small bass, and the second drift, Sunday night, only a few green males.

EXPERIMENTS WITH THE SPERMATOZOA.

Spermatozoa are active for about three minutes in water, after which time their swimming motion ceases. Placed on a microscopic slide they become attached to slide and cover glass by their tails, and their swimming ceases within one minute. Occasionally milt taken from a male does not show active spermatozoa at first, but after being left in a dish exposed for half an hour they become active when placed in water. If first they are placed in normal salt solution (.05 per cent), they will become very active on being placed in water. The salt solution seems to have a stimulating effect. The spermatozoa are active in water ranging from the temperature of freezing up to 90 degrees Fahrenheit. They are most active at temperature of 68 degrees Fahrenheit. They are killed at temperature of 100 degrees—110 degrees Fahrenheit. At a lower temperature than 42 degrees they are very sluggish. It was found that milt left in a dish exposed to the air, at a temperature ranging between 54 degrees and 68 degrees Fahrenheit, showed active spermatozoa after twenty hours.

We hope to demonstrate that striped bass eggs can be kept in an open dish and fertilized after several hours, as has been done with salmon and whitefish eggs, but all the lots of eggs saved for experiment happened to be from lots that turned out to be immature.

FOOD OF ADULT STRIPED BASS.

The food of the adult striped bass in the rivers is principally of carp, hardheads, and split-tails. Nearly all the fishermen claim that when the carp is plentiful it is their principal food. They even advance the theory that the bass are not so numerous in the San Joaquin because the carp are not so plentiful on the lower river, and they run up the Sacramento because of their great abundance in those waters.

FOOD OF YOUNG STRIPED BASS.

An examination of the stomachs of fifty young bass averaging 3 inches in length, which were taken at "Morrison's Bite" in Napa Creek on September 10, 1908, shows the following contents: Crustaceans, a species of Mysis, 30 per cent; of young shrimp, 15 per cent; of a species of Gammarus, 1 per cent; of an Isopod, 1 per cent, and 1 small crab. Marine worms or annelids, a species of Nereis, 45 per cent; of species not recognizable, 5 per cent; small fish, species not recognizable, 2 per cent.

It will, therefore, be seen that on this feeding ground, at least, marine worms comprise 50 per cent of the food, crustaceans of marine species 48 per cent, and small fish only 2 per cent. The young shrimp and young fish were taken from the stomachs of young bass of 3 to 4 inches in length and the other small crustaceans from the stomachs of specimens 3 inches and under in length, showing that the young bass begin feeding on the small species of crustaceans and worms, and as they grow in size are able to take the shrimp and young fish.

KEY TO FIGURES.

Fig. 1—Young striped bass—just hatched 80 hours from fertilization of egg.

Fig. 2—Young striped bass at seventh day.

Fig. 3—Young striped bass at thirteenth day.

Abbreviations. O.G., oil globule. Yk. Sc., yolk-sac. Br., brain. Ht., heart. St., stomach. An., anus. Bld., bladder.

The natural size of specimens is indicated by a line marked N.S. and all figures are magnified 15 diameters.

A study of the specimens shows that the yolk-sac is not entirely

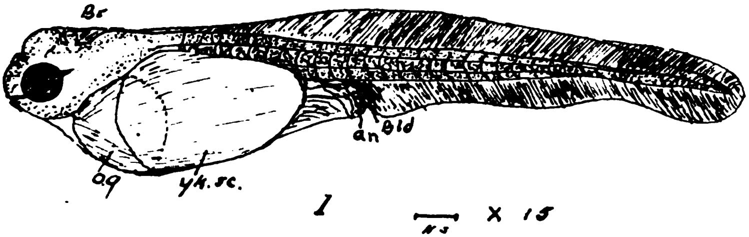


Plate 1. Young striped bass.

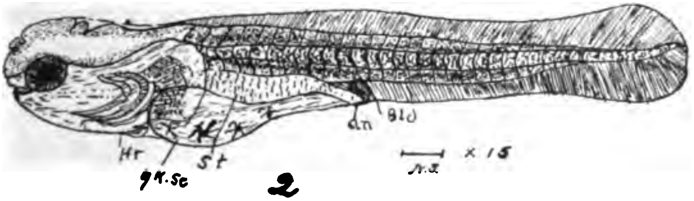


Plate 2. Young striped bass.

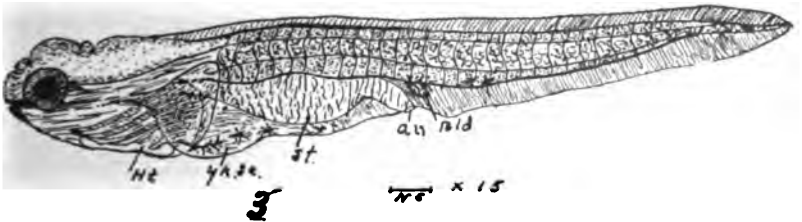


Plate 3. Young striped bass.

absorbed until after the seventh day, and that the stomach is not well developed until about the thirteenth day. The young fry were kept for two weeks in the McDonald hatching jar by removing the siphon tubes and replacing the top with silk bolting cloth, allowing a small stream of water to flow on the cloth.

EXPERIMENTS WITH COPPER SULPHATE IN KILLING FUNGUS INFESTING THE EGGS IN HATCHERY JARS.

A number of experiments were tried to determine if this fungus can be killed by the use of copper sulphate without injuring the fish.

1. The fungus can be killed by application of copper sulphate (1–500,000 parts).
2. Fish or developing eggs are killed by application of copper sulphate (1–10,000 parts).
3. A small proportion of eggs are killed by solution of 1–25,000.
4. About 1 per cent of eggs are killed by application of 1–50,000.
5. The developing embryos will stand an application of 1–100,000 parts of copper sulphate without harm. This strength kills all the fungus and other organisms except small crustaceans.
6. It can be applied directly to the affected jars by dropping the required quantity into the jar and allowing the water to run as it ordinarily would.

Example.—A jar containing 5,000 c.c. of water would require one twentieth of a gram of copper sulphate to equal 1 part to 100,000.

It may be applied to the entire lot of jars by mixing and dissolving the required quantity in a small amount of water and adding it to the water as it runs in from the pipe.

Example.—If the water is running at the rate of 2½ gallons per minute (1,000,000 c.c.), it would require 10 grams of copper sulphate dissolved in 5 quarts of water and added slowly to water at head.

This experiment was actually tried and a lot of eggs which were infected with fungus left attached to the trough, also a lot which had been treated twice by dropping sulphate into jar. Neither one of these lots were affected. The fungus is thus cleaned out of troughs and it may all be flushed out by running in fresh water after the water with sulphate has been in for thirty-five minutes.

The copper sulphate may also be used in a strong solution for cleaning used jars. There is usually a coating of oil on the inside of jars after one lot of eggs has been hatched in them and on this oil a collection of fungus and other micro-organisms. The application of the copper sulphate cleans this oil off and kills all fungus or bacteria that may be collected on the sides of the jars.

Troubles.—A considerable amount of trouble was experienced with most lots of eggs in keeping them in the jars at about 12 to 24-hour stage. The bad eggs became attached to the good ones and carried them over. It was found that under the ordinary pressure about 10 per cent of the good eggs would go off in this way. An examination under the microscope of the eggs that were going off showed that they were connected by the fungus and other organisms which collect on the dead eggs and attach themselves to the good ones, one bad one sometimes having two or three good ones attached.

It was found necessary to turn the water off during this stage, flushing off the dead eggs occasionally in order to not smother the live ones. One of the jars containing the larger percentage of dead eggs and in which the carrying over was greatest, was treated with copper sulphate (1-100,000) twice (30-minute interval). The water was then turned on in a stronger current than usual. This jar was kept going all the time that the other jars were shut off. The dead eggs moved off slowly, and while the live ones were in constant motion they did not go out.

From this experiment it would seem that the fungus and micro-organisms were killed by the application of the copper sulphate, and when killed were removed from the eggs by the constant motion of the eggs. The dead eggs were thus carried off without their becoming attached to the live ones, and the necessity of turning off the water (which endangers the fish from lack of oxygen) to keep in the good eggs was avoided.

PHEASANT RAISING.

Arranged by CHAS. A. VOGELSANG.

INTRODUCTION.

The State Fish and Game Commissioners, realizing that there is a strong and unsatisfied demand by hotels, restaurants, and by private citizens who do not hunt for wild game, and with a constantly increasing population, which renders it necessary to place greater restrictions (such as longer closed seasons and lessened bag limits) upon the amount of game that can be taken, believe that the situation could best be met through the establishment of a game farm, where pheasants and other game birds could be raised and distributed throughout the State, to people who would agree to give them proper protection and attention, and would take up the work of propagation seriously. The raising of pheasants in captivity has been carried on for years in European countries, and with considerable success in Eastern States.

It is the intention of the Fish and Game Commissioners to recommend at the forthcoming session of the legislature that pheasants raised in captivity can be sold in the markets. It would mean a new industry and would serve a double purpose. It would reduce the drain on wild game in the field, and give the profit that formerly went to market hunters to citizens and taxpayers who engage in a legitimate business.

At practically every session of the legislature for the past ten years some variety of game bird or animal has been added to the nonsale list, leaving wild ducks, wild geese and rabbits the only game that can be sold in the markets. It is only a matter of a very short time until wild ducks are added to the nonsale list.

The establishment of the game farm has been rendered possible by the hunting license law, which provides yearly a large revenue. Such a farm has been established near Hayward, Alameda County, at a cost of approximately $10,000, which includes in its equipment, houses, barn, water tank, pumping plant, pens, horse and wagon, necessary tools, and the original stock of birds. Our first year's work was performed under serious disadvantages. We raised, however, 1,200 pheasants. We expect to have 3,000 for liberation this year. All expenses in connection with this game farm are paid out of the hunting license fund, without taxing the general fund of the State one cent.

As an aid to those who are desirous of embarking in such an enterprise, we offer the following brief account of methods that have been proven successful by this Commission and other experienced breeders.

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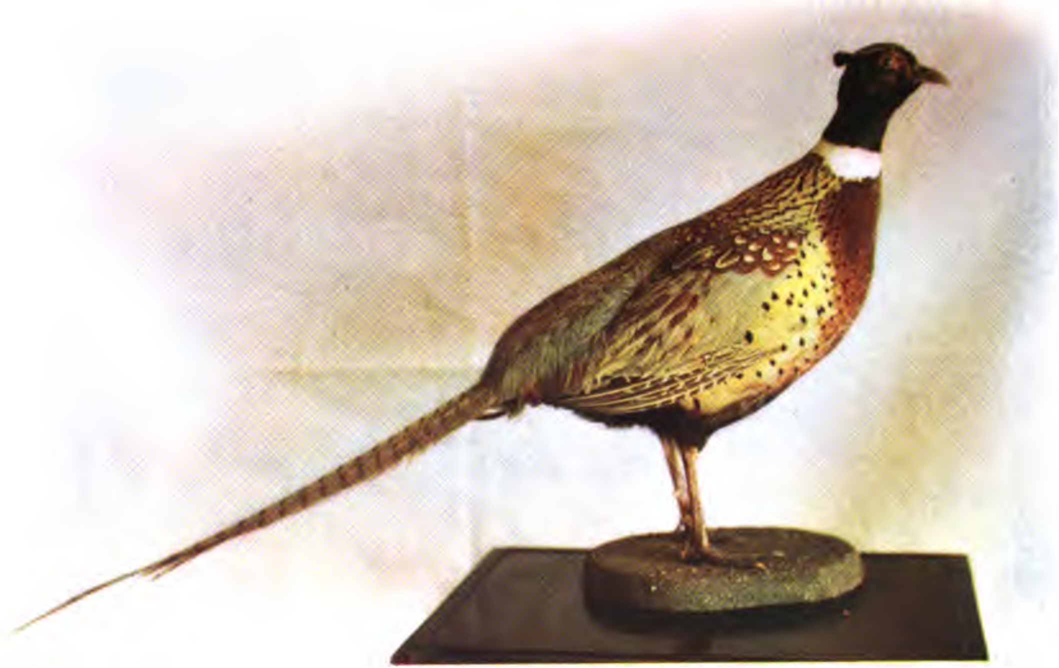


TYPE, MALE RING-NECK PHEASANT (*Phasianus torquatus*)

TRICHROMATIC PHOTOGRAPH TAKEN FROM MOUNTED SPECIMEN

We have quoted largely from Farmers' Bulletin No. 390 on "Pheasant Raising in the United States," issued April, 1910, by the United States Department of Agriculture, and prepared by Henry Oldys, Assistant United States Biological Survey.

PENS.

The location of the pens is a most important factor. Well drained, sandy or gravelly land facing the south should be selected if possible, and the pens arranged to get all the sunshine possible during the wet months, as sunshine is one of the very best preventives of bird diseases. In hot locations the pen can be shaded when necessary.

A good sized pen or run for one cock and four hens would be about ten feet wide by sixteen feet long and six feet high. The sides and top should be covered with one-inch mesh poultry netting, carefully fastened and sunk into the ground *at least a foot,* to keep out burrowing animals. It is well to have an entrance at both ends of the pen for convenience in gathering eggs. A shed should be built in the north end of the run, with the side facing the sun, open. This shed should be at least four feet wide by six feet long and as high as the sides of the pen. A roost should be provided the length of the shed and a foot and a half above the ground. The *front of the shed must be left open* or the birds will not enter; the roof, rear and ends should be tight. When possible, it is well to enclose in the run small trees or shrubs for the birds to use as perches and for roosting; they will, besides, provide a shade during the hot summer months. Pheasants usually refuse to roost under cover; consequently, roosts of some sort must be provided in the open. Where more than one pen is used, they should communicate with each other, either directly or through a covered alleyway. This greatly facilitates the moving of birds from pen to pen.

It is absolutely essential that the pen be kept clean and free from lice at all times. The pheasant is a wild bird, with greater vitality than domestic poultry, yet conditions and diseases that affect poultry but slightly are fatal to the hardier bird. It is, perhaps, safe to say that most failures in pheasant rearing are due to filth and lice. We can not emphasize this fact too strongly; keep your pheasants in clean quarters and free from lice or you will lose them.

Before the beginning of the mating season it is advisable to move the adult birds to a fresh, clean pen. The ground in the old pen should then be spread with unslaked lime, allowed to stand two or three weeks, and then spaded up and planted to some grain or vegetable crop. All woodwork about pens and sheds should be sprayed or washed several times during the year with a good wash made with unslaked lime and water, to which has been added carbolic acid in the proportion of six ounces of acid to the gallon of wash. No whitewashing should be done during the laying season, as the hens are so affected by the odor as to stop laying.

HANDLING NEW BIRDS.

When a shipment of pheasants is received, first of all consider that they will feel strange and timid; therefore, they must be quietly handled. Place the crate in the pen, with food and water near by. After arranging it so that the birds can come out when they get ready, leave them and keep away from the pen, except when necessary to feed and water, as pheasants are easily scared when changed to new quarters. After a few days they will become accustomed to their new home and can be cared for without trouble. The same person should attend to the birds all the time if possible, and should always wear the same clothing when among them, as they are sensitive to any change of appearance and become frightened very easily. Strangers always bother the birds, and dogs and cats should never be allowed near the runs. Handle the birds only when actually necessary, and then only by grasping them *over* the wings and around the body. Never grasp them by the wings or legs, as is commonly done with poultry.

FEED FOR ADULT BIRDS.

Those foods that contain the elements and properties of their natural food supply, and to which they have been accustomed through centuries of feeding in the wild state, are naturally best suited to the pheasant in captivity. Do not overfeed, as it is sure to induce disease. The pheasant is a small feeder, needing only about half as much food as the chicken.

Variety in food is very important, as the pheasant in his wild state eats practically every edible substance he finds. Adult birds require feeding morning and evening, no more food being given them than will be cleaned up. We have found the best food to be a mixture made after the following formula:

Broken wheat (not screenings)	20 pounds
Fine (granulated) cracked corn	15 pounds
Oat groats	15 pounds
Coarse beef scrap	10 pounds
Millet seed	10 pounds
Canary seed	10 pounds
Rape seed	5 pounds
Hemp seed	5 pounds
Fine chicken grit	5 pounds
Fine granulated charcoal	5 pounds
	100 pounds

We should say at this point that none of the various poultry foods that we have tested has proven suitable for pheasants. The birds must have plenty of green ground bone at all times and be given an abundance of green feed, such as cabbage, lettuce, swiss chard, fine cut lawn clippings, clover or alfalfa. They like lettuce best. Pheasants get unthrifty at once if deprived of the green stuff they need. Fresh water in abundance *must* always be handy. Scald all watering dishes *every* day, and keep drinking water in the shade or change it often; warm water favors the development of bacteria that cause disease.

MATING SEASON.

The mating season will, of course, vary with the locality, but, generally speaking, it begins in April and extends into August. In captivity the pheasant hen lays from forty to seventy-five eggs. Nests are useless, as the hens will seldom use them, but drop their eggs on the ground anywhere in the pen.

The eggs should be gathered as soon as laid, or at least twice a day; otherwise the birds (particularly the males) will eat them. A sure cure for the egg-eating habit is to blow some eggs and fill them with melted soap and place in the pens. Eggs should be set as soon as possible; after they are fourteen days old they are unfit for hatching.

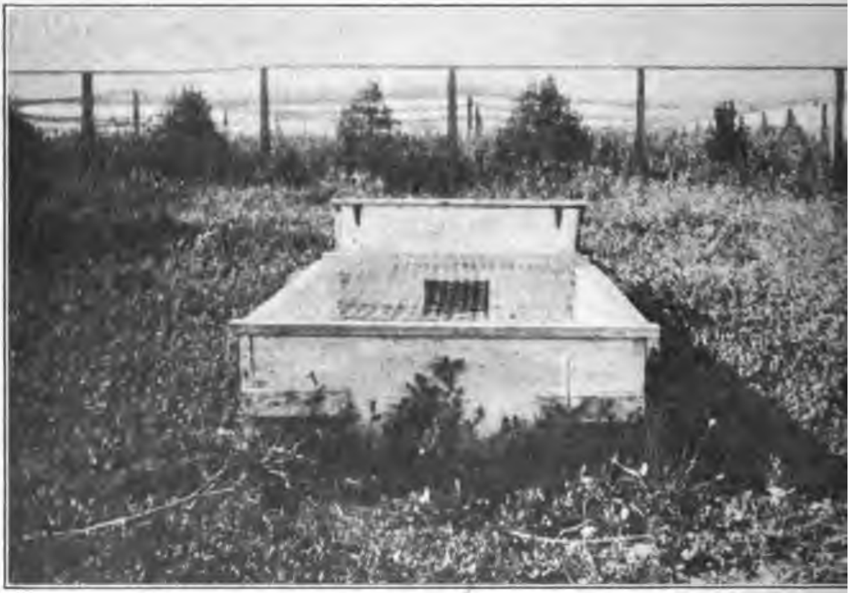
After hens have stopped laying for the season they can often be encouraged to resume by moving them and the male to a new, clean pen. The "lay" in the new pen sometimes exceeds that in the old one, and, of course, more than pays for the expense of extra pens.

HATCHING.

The pheasant hen in captivity is a poor mother; besides, it is more profitable to keep her laying. Wyandottes and Rhode Island reds make the best "mothers" for pheasant eggs and chicks, although any domestic hen will do, so long as she is a good "setter." Turkey hens are splendid mothers, as they are very quiet on the nest and careful with young birds. They seldom step on the chicks and are not so given to roaming as hen chickens are. The eggs must be set so that they will receive the benefit of ground moisture in a nest made after this plan:

Dig a hole *in the ground* in a shady place and shape a nest in it with excelsior; a handful of onion skins is a valuable addition, as they help to keep lice away. The nest should be enclosed with a box without a top and about twelve inches high to prevent the young birds from escaping as soon as they hatch. Before placing the hen on the eggs be sure that she is free from lice and disease, as lice are certain death to young birds and are the cause of most failures in raising pheasants. One insect feeding on top of a chick's head will kill the bird if not destroyed or removed. Dust the setting hen with some good lice powder, at least three times during the hatching period (but not within three days of hatching), and if at any time the young birds show evidence of being infested with lice, such as drooping and refusing to eat, dust them with lice powder and grease under their necks and on top of their heads v lard or olive oil.

From fifteen to seventeen eggs make a good setting for a chicken h while a turkey hen will cover from twenty to twenty-five. The pe of incubation varies from twenty-one to twenty-eight days, although v fertilized eggs usually hatch on the twenty-third day, and all about same time. The hen should be undisturbed during the hatching t and the young birds left in the nest until the youngest is a day old they need the "mother's" warmth for drying and strength-giving.



A coop for the mother and her chicks should be ready as soon as th are taken from the hatching nest. A cut and description of a very sa factory coop is given herewith.

This coop (as shown) is three feet wide by six feet long and is twe inches high, except in the hen's compartment, which is raised to twe inches at the inner end. A space two feet long should be partition off at one end for the hen and an eight-inch opening left. This openi should be covered with slats spaced so that the chicks have just enou room to pass from one compartment to the other. The hen's compa ment should be made with a hinged cover, to facilitate feeding a handling, while the runway should be covered with one-inch mesh n ting, set in a sliding frame. It is a good plan to set the coop on freshly cut grass plot and move it daily. The tender shoots of n grass form a wholesome part of the chick's food, and they are very fo of it, besides which, there is daily provided a supply of insect life.

After the chicks are four days old and know the call of their foster mother, they may be allowed to leave the coop after the morning dew has disappeared, and forage for themselves. Many breeders even allow the hen and her brood their freedom until the young birds show a disposition to fly out of the enclosure, when they transfer them to covered pens. Young birds cared for in this manner will be hardier and freer from lice and disease than those confined in coops.

THE FEEDING OF PHEASANT CHICKS.

It is important that the hen and her brood be fed separately. The young birds should not be fed at all until they are twenty-four hours old, as they come from the shell sufficiently well nourished to maintain their strength for that length of time, but they should have clean sand or fine gravel to pick at from the first. By the second day they will begin to get hungry and need feeding every two hours. After they are five days old, let the feedings be gradually reduced, until, at the expiration of three weeks, the birds are being fed but three times a day.

As soon as the young birds are ready to eat, they should be fed on a milk curd made as follows: Heat one quart of sweet milk to the boiling point, stir in ten eggs (well beaten) and then cook until the curd is well done. Strain off the watery fluid and you have a crumbly food that contains nearly all the elements essential to young pheasant life. A mixture of milk, eggs, and oat or corn meal in proportions to make a dry crumbly mixture is also a fine food. Boiled potatoes, mashed and mixed with finely chopped hard boiled eggs, corn meal, and bran—with or without finely chopped scraps of meat—provides a food that the young birds like. Still another suitable food is a mash of corn grits, wheat middlings, bone meal, beef scraps, and milk, made rather dry. In making curd, make only enough to last one day, as it spoils quickly, and sour food is death to the birds.

Maggots are the very best animal food for young pheasants. They are easily procured, and the chicks may eat as many as they desire with perfect safety. But maggots should not be given to the birds until they have lain in bran long enough to clean themselves. Maggots when taken direct from meat seem to be poisonous and are a dangerous food. Maggots may be procured in various ways, but we will describe but two plans, both of which have been used by us. Take crushed green bone and finely chopped meat, and place out doors until the mixture is well covered with fly eggs. Then fill a box or pan half full of bran, over which spread thin scraps of liver or meat for food for the maggots, and spread the flyblown green bone and meat on top. Another good method is to hang a beef or sheep head until the maggots get big enough to drop out. Then place a box of bran underneath and allow the maggots to lay in the bran a day of so before giving them to the birds.

Lettuce is a splendid food for young birds, and they should have it all the time. Fasten a head to the ground with a sharp stick and the birds will pick it off as they want it. Leave no remnants of food around the pens to become stale, and keep everything as clean and dry as possible. Dampness causes colds and gapes. Have plenty of fine grit and sand in reach at all times, and it is well to keep a pan with such food as is fed to the adult birds in the coop so that the youngsters may learn to eat it.

For watering the young birds, it is best to use the fountain jars that can be bought of any poultry supply house. The quart size is the best. Their drinking water *must always be fresh* and the fountain jars (and food pans) should be cleaned and scalded every day.

Usually the birds can be moved to the large runs by the time they are two or three weeks old. *Don't* put them with old birds. By the time they are five weeks old they may be fed anything they would find in the wild state. Young birds (as well as old) must always have dust or ashes to "dust" themselves in. This is their way of taking a bath and freeing themselves from insects.

DISEASES OF PHEASANTS.

By George Byron Morse, M.D., V.S.

In charge of investigations of diseases of birds and cold-blooded animals, United States Bureau of Animal Industry.

DISEASES AFFECTING YOUNG PHEASANTS.

Pasting.—Pasting occurs usually during the first week of life. The chick loses its vivacity, sits with eyes closed and its downy coat fluffed until it appears like a ball. Examination reveals the vent plugged or covered by a whitish, chalky, or pasty substance. This stoppage of the vent frequently leads to death in a day or two as the result of the absorption of putrefactive poisons due to retention of the feces. Treatment consists in the immediate, gentle removal of this chalky plug and the application of a few drops of sweet oil or a bit of petrolatum.

Diarrhea.—Whitish diarrhea may be caused in very young chicks by cold, by overheating, by overfeeding, or by too little or too much water. The observant fancier will come to recognize these conditions almost instinctively, and will relieve them by at once altering the régime. This should be all that is necessary. If more is required it is evidence that either the case has been permitted to run so long that the chick is too weak to recuperate or infection is operating.

White diarrhea of chicks, so dreaded by the poultryman, is an affection of pheasant chicks as well. The diarrhea is merely a symptom of a severe infection of the intestines, especially of the blind pouches or ceca, by a low form of animal life, known as *Coccidium tenellum,* and we therefore speak of the disease as an intestinal coccidiosis. The white coloration of the fecal discharge, as in the two previous diseases, is due to excretions from the kidneys. In certain virulent forms of the disease the minute blood vessels on the inner portion of the intestinal wall burst, and the bleeding gives rise to a dark brown or even blackish coloration, which obscures the white effect of the uric acid.

Treatment should begin with the administration of Epsom salts, mixing them in a mash and estimating from eight to fifteen chicks to one teaspoonful of the salts, according to age, size, and previous thriftiness. The drinking water should contain sulphate of iron (copperas) in the proportion of ten grains of the copperas to one gallon of water or enough permanganate of potash may be added to the drinking water, to give the water a claret-red color. The coops, feeding utensils, drinking vessels, and runs should be disinfected. As a preventive measure, incubators and brooders should be cleansed and disinfected, and, prior to incubation, whether natural or artificial, the eggs should be dipped in ninety-five per cent alcohol or in a four per cent solution of some good coal-tar disinfectant.

DISEASES AFFECTING MAINLY ADULT PHEASANTS.

Roup.—Certain affections known as contagious catarrh, diphtheria, and roup, if, indeed, they be distinct diseases, generally group themselves in the fancier's mind under the one name, roup. The term diphtheria should not be used, because it belongs properly to that disease in the human family which is caused by a special bacillus which does not cause disease in birds. The other two names may represent two different stages of the same disease, a contagious inflammation of the mucous membranes of the eyes, nose, mouth, throat, gullet, or windpipe, which may express itself by a watery, sticky, bad-smelling secretion, or by the development of yellowish patches.

In the treatment of these affections the first thing is to recognize the contagiousness and to isolate the sick birds. Disinfect the houses and ground. Make a mixture of peroxide of hydrogen and boiled water, equal parts; into this plunge the head of the affected bird. By means of a slender wire covered with a little absorbent cotton and dipped in this mixture clean out of the eye or scrape off the tongue and sides of the mouth all yellowish matter, and apply a four per cent solution of borax or boracic acid or the peroxide solution named above. Give all birds, sick and well, a dose of Epsom salts. Keep iron sulphate or permanganate of potash in the drinking water.

Enteritis.—Enteritis, as used in bird medicine, means inflammation of the intestines. While it may originate from cold, improper feeding, and the like, it is usually an infectious disease and calls for prompt cleansing of the digestive tract, which is best accomplished by Epsom salts or a teaspoonful of castor oil containing about fifteen drops of turpentine. Add iron sulphate or permanganate of potash to the water; isolate the affected birds. Disinfect thoroughly the houses, utensils, and grounds, and sprinkle lime everywhere. The causes may be coccidia, such as we find in white diarrhea of chicks; flagellates, as in the canker of pigeons: or bacteria, as in Klein's infectious enteritis.

Cholera.—Cholera would really come under the third class just mentioned. The organism causing it is frequently so virulent that death comes within a few hours, even before the diarrhea symptoms have had time to manifest themeslves. The treatment would be practically that outlined under enteritis, although treatment is usually of no avail. Kill the very sick and treat only the apparently healthy, thus anticipating and preventing the disease. Necessary in all the other diseases, it is of supreme importance in cholera to burn quickly all dead birds, after saturating them with coal oil. Burying deep and covering with lime may have to do, but it is not so good a method. In killing the sick birds do not use the ax, and thus spatter everything with the infective blood.

Scurfy legs.—The affection known as scurfy legs, scaly legs, scabies, or mange of the legs and feet is caused by a parasitic mite, *Sarcoptes mutans,* which burrows under the scales and by its presence sets up an irritation which causes a rapid increase in production of cells, together with a secretion resulting in a gradual thickening and elevation of the scales. Being a parasitic disease, scaly legs is transmissible from one bird to another and from infested houses, perches, nests, etc. Treatment must begin with isolation of the patient and the thorough application to the coops and fixtures of boiling soapy water, then kerosene, and finally a coat of five per cent carbolic acid, to which has been added enough lime to make a whitewash. The affected bird should have its legs soaked in warm soapsuds, this part of the treatment being completed by a good scrubbing with a small hand scrub. This alone has cured the disease. However, it is best to follow this with a good rubbing of sulphur ointment (one part flowers of sulphur to nine parts of lard, sweet oil, or vaseline).

GENERAL REMARKS.

Pheasants can be hatched in incubators and raised in brooders, but unless one has had much experience along those lines, it is best to resort to the domestic hen.

There are numerous other methods of raising pheasants, but from the success had with this one we recommend it as particularly satisfactory.

The best plan is to always follow nature as closely as possible and *beware of filth and lice.* For any information that you may desire which is not contained in this booklet, write to the "Superintendent of the State Game Farm, Hayward, Cal.," and he will give you such suggestions as you may need to make a success of raising pheasants. Any one going into the business extensively should have special instructions and must provide a different equipment.

IMPORTANT.

HOW TO LIBERATE GAME BIRDS.

If game birds are taken from the crates and left to fly, in their fright and desire to get away as far as possible from the crate, they will continue until exhausted. Such a flight will land them outside the lands they are intended for and will scatter them so badly that the pairs may never be reunited. If this is not the case, the exhausted birds will fall easy prey to predatory birds and animals.

To prevent this it is best to take the crate to some suitable location—in or near thick brush and with water at hand—and scatter plenty of feed about. Now quietly open the doors and go away from the crate, allowing the birds to leave in their own way—undisturbed by any one. If liberated in this manner, the game almost invariably will make its home close to the spot where it found its first food.

Birds should be liberated during the daytime so that they may get together, if scattered, and select a safe roosting place before night comes on. Where it is possible to do so, splendid results will be obtained by opening the crates in some old barn or ranch building and keeping the birds penned up for several days before allowing them their full liberty.

If the birds are fed and watered and left to themselves, they will recover from the effects of close confinement and traveling, and be in such condition that predatory hawks and "varmints" will do them no harm. When ready to liberate them, open a door and allow the birds to come out in their own way and time.

Game birds should not be liberated where their natural enemies are numerous. By trapping, poisoning, and other means, endeavor to kill off all predatory animals and such birds of prey as the great horned owl, sharp-shinned hawk, Cooper's hawk, duck hawk, butcher bird, and blue jay, before turning out any birds.

STATE OF CALIFORNIA

FISH AND GAME COMMISSION

TWENTY-SECOND BIENNIAL REPORT

For the Years 1910-1912

FRIEND WM. RICHARDSON, SUPERINTENDENT OF STATE PRINTING
SACRAMENTO, CALIFORNIA
1913

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LETTER OF TRANSMITTAL.

San Francisco, Cal., December 31, 1912.

Hon. Hiram W. Johnson, Governor,
State of California, Sacramento, Cal.

Sir: In accordance with law, we submit for your consideration a statement of the transactions and disbursements of the Board for the biennial term July 1, 1910, to June 30, 1912.

We are also including certain data concerning the transactions of the Board between July 1, 1912, and the date of this report, believing that the value of such data has justified holding the report for it. Certain technical reports which have hitherto been included in the Board's report are this year being issued in separate bulletins.

Respectfully,

F. M. NEWBERT, *President,*
M. J. CONNELL,
CARL WESTERFELD,
Board of Fish and Game Commissioners.

CALIFORNIA FISH AND GAME COMMISSION.

Commissioners, 1910-11.

M. J. CONNELL	Los Angeles
W. G. HENSHAW	San Francisco
F. W. VAN SICKLEN	Alameda
LENDAL M. GRAY	San Francisco
DR. DAVID STARR JORDAN	Palo Alto
GEO. V. STEED	San Francisco
F. G. SANBORN	San Francisco
CHAS. A. VOGELSANG *Chief Deputy, 1910.*	San Francisco
JOHN P. BABCOCK *Chief Deputy, 1910–11.*	San Francisco
HARTLEY F. PEART *Attorney, 1910–11.*	San Francisco

Commissioners, 1911-12.

M. J. CONNELL	Los Angeles
F. M. NEWBERT	Sacramento
CARL WESTERFELD	San Francisco
ERNEST SCHAEFFLE *Secretary, 1911–12.*	San Francisco
W. H. SHEBLEY *Superintendent of Hatcheries, 1911–12.*	Sisson
R. D. DUKE *Attorney, 1911–12.*	San Francisco

PART I. GENERAL.

TWENTY-SECOND BIENNIAL REPORT OF THE BOARD OF FISH AND GAME COMMISSIONERS.

PERSONNEL AND ORGANIZATION.

Since July 1, 1910, the personnel of the Board has been as follows: M. J. Connell, W. G. Henshaw and F. W. Van Sicklen served until November 3, 1910, when Lendal M. Gray was seated as a member, succeeding F. W. Van Sicklen, resigned. On November 4, 1910, Dr. David Starr Jordan was seated as a member, to succeed W. G. Henshaw. Upon the death of Commissioner Gray in December of 1910, Geo. V. Steed was appointed to serve, but was never seated as a member of the Board. F. G. Sanborn was seated as a member on January 21, 1911, to succeed Mr. Steed. On August 4, 1911, F. M. Newbert was seated as a member of the Board, to succeed Dr. David Starr Jordan, resigned. Carl Westerfeld presented his credentials on January 2, 1912, and was thereupon seated as a member, to succeed F. G. Sanborn.

On August 11, 1910, John P. Babcock assumed the position of Chief Deputy, succeeding Chas. A. Vogelsang, who had been the Board's executive officer since October 12, 1901.

On November 29, 1911, the Board by resolution, abolished the position and title of Chief Deputy, and appointed Ernest Schaeffle as Secretary, to succeed Mr. Babcock, whose resignation had been tendered and accepted that day.

On the same day the position of Superintendent of Hatcheries was created, and W. H. Shebley, Superintendent of Sisson hatchery since 1893, was promoted to the place. Mr. Shebley has remained in charge of Sisson hatchery, being assisted in the management by R. W. Requa, assistant superintendent, and has in addition directed the Board's work in the field of fish culture and distribution. During the past nine months Mr. Shebley and his assistants have also made surveys of practically every dam and other stream obstruction, and of many of the ditches and canals in the State and have had charge of the construction of fishways and screens.

Hartley F. Peart, who had acted as the Board's attorney for over five years, presented his resignation on February 6, 1912. Mr. Peart's resignation was accepted and R. D. Duke of San Francisco appointed his successor.

Since the filing of the Board's last report, it has been deemed expedient to form a new administrative district, in addition to the San Francisco, Los Angeles and Fresno districts, already existing. The new district is in charge of Commissioner Newbert, with an office in the Forum building in Sacramento. District management adds to the cost of administration but, in the Board's opinion, greatly increases efficiency. It will probably be found necessary within the next two years to further divide the northern part of the State.

PROPERTIES.

At the request of the State Controller an inventory of the State's property in the care of the Board was taken on June 30th of the present year. A skeleton inventory that will be found elsewhere in this report shows the total value of property under appropriate headings.

PEACE OFFICERS.

It should be plainly stated at this time that the enforcement of the fish and game laws of the State has been left almost entirely to the Board, except in those communities and counties so fortunate as to possess public officers alive to their responsibilities and to the value of assisting in the saving of one of the State's most important assets. The Board has received and appreciated the endorsement and support of many police, prosecuting, and judicial officers in the State and expresses this criticism with the greatest regret and the knowledge that it will cause some ill feeling and friction. The property of the people is at stake, however, and we feel that we would be recreant to the trust imposed upon us if we did not call attention to what we have learned to be a real evil.

Many fish and game officials object to any coöperation between game wardens and peace officers, arguing that no one but a specialist is competent to act in work that is so peculiarly a specialty as fish and game wardenship. The argument does not seem a sound and sufficient one, although we must grant that the best work to be done by game wardens can only be done by officers specially and thoroughly trained in the ways of fish and game, and of fishermen and hunters.

FOREST SERVICE CO-OPERATION.

The Board wishes to speak of the splendid assistance it has received from the United States Forest Service, under the direction of District Forester Coert Du Bois, ably assisted by the supervisors of the nineteen national forests (or forest reserves) in the State. Upon the recommendation of Mr. Du Bois and the supervisors, the Board has deputized over three hundred forest officers, or "rangers," and knows that splendid work has been accomplished by them.

An effective coöperation between the two departments is made possible only by a system of direct supervision, by chief forest deputies on each forest, devised by Mr. Du Bois. Through it the Board is relieved of the necessity of issuing instructions to and receiving reports from over three hundred active men, who undoubtedly are more efficiently and satisfactorily directed by their own chiefs. Each chief forest deputy files a special report with the head office of the Board on the first day of January and on the first day of July of each year, in addition to keeping up a more or less regular correspondence.

By a ruling of the Forest Service, none of its officers can receive compensation for assisting in the enforcement of state laws; it has been possible, however, for the Board to pay the expenses necessarily incurred by forest officers in the prosecution of fish and game cases.

SALARIED, OR REGULAR DEPUTIES.

The Board has a force of deputies (patrolmen or game wardens) distributed over the State at the present time, apportioned to districts as follows: San Francisco, 24; Sacramento, 29; Los Angeles, 11; Fresno, 9.

This force has been built up very largely since 1907, when the revenues of the Board were increased through the first receipts from hunting license sales, and in the opinion of the Board constitutes a very effective and creditable body of officers. The splendid police record made by these men, as shown in the statements of seizures and prosecutions, published in this and in previous reports, is the highest praise that need be offered them.

The state "game wardens" of California are probably the best paid wardens in the world, and the Board believes that every man on the roll is worth what he receives, if not more. Cheap men could be obtained, of course, but men who can do the work needed in this State are not cheap men, and are available for the state's service only as they are assured of proper compensation.

The deputies, or "wardens" in each administrative district, report to the Commissioner or deputy in charge of the district and perform their duties as directed by him. The head office has only the most general supervision of the work within the outside districts and is seldom required to act in even an advisory capacity.

"OUTSIDE," OR SPECIAL DEPUTIES.

The special deputies assisting in the Board's work now number about 400 men, exclusive of forest officers. Many of these deputies have records that compare favorably with those of the most efficient regular officers, while the force as a whole serves as a very valuable and thoroughly appreciated auxiliary. Even if little police work were done by this body of irregular officers, it would still serve as a training school from which to recruit regular deputies.

Every effort is made to keep undesirable candidates out of this force and to weed out with the least possible delay all those who prove unfitted from any cause.

The special deputies receive no salaries, but are paid for their services in prosecutions and are sometimes allowed expenses.

PROGRAM AND WORK.

We recognize that we are administering a public trust, that to us has been assigned the duty of protecting and conserving the fish and game interests of the State for the benefit of all the people, and that to be successful we must have their active coöperation. We believe we can gain their confidence and support by keeping the people fully informed of the nature and scope of our work. We shall attempt to do this by issuing letters and bulletins from time to time, as well as by complying with that provision of the law which specifically requires this Board to biennially submit to the Governor a full report.

We aim to work on broad, practical and economical lines, and to make the Commission something more than a police force. We shall endeavor to enforce the laws for the preservation of fish and game, and to stock the public waters of the State with food and game fishes best suited to them. By economic and scientific investigations we hope to disclose the life, habits, and abundance of our fish and game, and the conditions most favorable to conserve and, if possible, increase the supply.

We shall maintain a State Game Farm, and shall use every effort to propagate our native species of game, and in particular, the valley quail, recognized as one of the finest game birds in the world—and certainly the game bird best suited to the uplands of this State.

We shall continue to operate the fish hatcheries to their full capacity, and to distribute the output in suitable public waters in every section of the State. We will not stock private waters. We shall give to the distribution of the fish produced in the fish hatcheries the greatest care, endeavoring not only to see that the young fish are intelligently liberated where they may best thrive, but by close observation to ascertain the success of such methods, and to ascertain further if additional and more effective measures can be found.

It has already been demonstrated that the operations of the hatcheries and the stocking of streams in the State with native and nonindigenous fish have produced great results. No other state has reaped as great reward from the moneys so expended.

We believe that, notwithstanding the notable success that has already followed the introduction and the acclimatization of new food and game fishes in the waters of this State, as well as the propagation of our native fishes, much can yet be accomplished; that our waters may be made to produce even more abundantly; for, notwithstanding that this Commission has been in existence for forty years and has accomplished greater results than any similar commission in the United States, very little attention has been directed to a study of the life and habits of any of our food fishes. To intelligently conserve and increase our aquatic food supply it is essential to be conversant with the life, habits, food, abundance and the principal enemies. Until we know the time and place where our food fishes propagate, the waters frequented by their young, and the conditions essential for successful development, we can not proceed intelligently. And, we regret to say that until recently, the Commission was not in possession of sufficient positive information of this character. To obtain such knowledge, we have during the past eighteen months begun a systematic and scientific investigation of the life of our most important food and game species. For this work we have been enabled to enlist the services of several well known scientific men.

The study of the life, abundance and the conditions most favorable to the maintenace of our edible crab (*Cancer magister*) was begun under the auspices of the Board in October of 1910. The work is in the hands of F. W. Weymouth of Stanford University, who is a recognized authority. At the time this investigation was instituted little was known as to where or when these crabs propagate, or the life of their young.

Professor Harold Heath of Stanford University, at our direction, began in December of 1910 a research intended to disclose the life and range of our edible clams. Very little or nothing is known of the life of these valuable mollusks. There appears, however, to be only a limited area in this State which affords opportunity for their existence, and in consequence, we believe that there is great danger that, with the increasing demand and the present unrestricted methods of digging them, the clam beds of the State may be speedily exhausted. We hope, through the efforts and studies of Professor Heath and his assistants, to be able to lay sufficient facts before the legislature to warrant the adoption of measures that will insure the future supply.

The spiny lobster, or "crawfish" fishery of the southern coast is a very important one, but like the other fisheries has been greatly reduced by the heavy operations of recent years. To obtain the accurate information necessary to any scheme of rehabilitation, Professor Bennet M. Allen of the University of Wisconsin, was engaged in July of 1911 to make a study of this animal. Professor Allen's work has been interrupted by the necessity of returning to his university for teaching, but it is hoped that a continuance of his investigation may lay bare many secrets now hidden.

In August of 1911 Dr. Chas. L. Edwards of the University of Southern California undertook a study of our abalones. Dr. Edward's preliminary report, which will be found in the Board's 1913 Fish Bulletin No. 1, is a very complete exposition of the need and value of his particular investigation.

In addition to the investigation that we have begun into the life history of our principal food and game fishes, we have also instituted an investigation of the relations of certain birds to the agricultural interests of the State. Harold C. Bryant, of the State University at Berkeley, has been engaged to conduct the inquiry. We hope to show in what manner each doubtful species of bird affects the farmer and the fruit grower, and what measures are to be taken to encourage the beneficial birds and to exterminate the injurious ones.

Believing that great good will come from the proper education of our children as to the value of the wild birds and animals to the farming interests of the State, and not alone to the sportsmen and the lovers of nature, we have engaged the services of Gretchen L. Libby, late secretary and lecturer for the Audubon Society of California, to conduct a campaign throughout the public schools of the State.

In March of the present year, it was suggested to the Board by Dr. C. A. Kofoid, Professor of Zoology of the University of California, that there was urgent need of a scientific study of the deer and other large game animals of the State. Dr. Kofoid stated that the study had been recommended to him by Dr. Palmer of the U. S. Biological Survey, as the basis for advanced conservation measures, without which our large game could not be preserved. Acting upon the recommendation of Dr. Kofoid and Dr. Palmer, Frank C. Clarke, a post-graduate student of the University of California was employed to conduct the investigation mentioned. Mr. Clarke has traveled over much of the State during the past four months, obtaining information as to distribution, numbers, breeding seasons, etc., that we consider of much value. A preliminary paper will be found in the Board's 1913 Game Bulletin No. 1.

N. B. Scofield, a fishery expert who has been in the employ of the Board at periods for a number of years, has made scientific studies of the shrimp and salmon during the past two years. Mr. Scofield has also assisted in stream surveys along the coast, and has made as thorough a study as his time has permitted of the operations of the trawl fishermen working outside the Golden Gate, and of the lampara net fishermen of Monterey Bay. Several of Mr. Scofield's reports appear in the Board's 1913 Fish Bulletin No. 1.

A very large and important part of the Board's work in the last ten years has been the regulation of various industries in order to prevent or minimize the pollution of the State's waters. While the results obtained are not yet fully satisfactory, we believe that the Board's work deserves public approval.

Outside of cities with their sewage, the principal sources of stream pollution at present are quartz mills and oil refineries, oil loading stations and oil carriers. All of these sources are now in the way of proper handling, after the expenditure of much effort and money.

As will be shown by this and by reports filed previously, the Board has instituted a considerable number of prosecutions for the pollution of State waters. By far the greater work, however, has been done in obtaining a compliance with the statutes through less expensive and tedious means. It is impossible to obtain even an estimate, but we believe that $250,000 has been spent at the Board's direction in the past two years in constructing oil traps and settling basins, proper hose and pipe connections, acid recovery plants, lampblack and oil-tar separators and filters, sawdust burners, and other contrivances and systems having as their sole purpose the safeguarding of public waters and the protection of the aquatic life therein.

WHAT THE COMMISSION HAS DONE IN TWO YEARS.

Has taken its place in the front rank of state fish and game commissions by instituting and prosecuting scientific investigations of game and fish, in almost every case with the coöperation or under the direction of the State's leading universities.

Has placed the work of fish culture and distribution on a proper foundation by creating the position of Superintendent of Hatcheries, by appointing a highly qualified expert to the place, and by then allowing him to manage the department.

Has made the greatest and best distribution of trout (over 26,000,000) ever made in the State.

Has provided a department of game conservation, under the direction of a competent expert, which in time will be as important as the fish cultural department.

Has economically managed the State Game Farm, and distributed more pheasants during the season of 1912 than were distributed during three previous years.

Has increased the force of wardens by over twenty men, providing an effective patrol for every part of the State, and particularly the northern part.

Has increased the efficiency of the wardens by detailing special deputies, the Board's attorney and others, to instruct them as to their duties and the subjects with which they have to deal.

Has greatly increased the efficiency of the service in the northern part of the State by forming the Sacramento district from a district that comprised almost fifty per cent of the total area of the State, and by leaving the direction of business in this district to the President of the Board.

Has fairly but firmly enforced all the fish and game laws in every part of the State, prosecuting 2,063 cases, against 1,771 for the best previous two-year period. (The record for the past two years would be much greater were it not for the fact, in the Board's opinion, that violations are becoming less and less common.)

Has aroused public interest in fish and game conservation by directing and otherwise aiding in the formation of a great and representative protective organization, with a membership of over 16,000 people, scattered through every county in the State.

Has made surveys of almost every stream and lake and other body of water in the State, disclosing the fact that hundreds of square miles of water have passed out of control of the public, and that hundreds of square miles are still entirely barren or have no valuable fish.

Has made a comprehensive survey of the natural and artificial waterways of the State, following this by directing the construction of hundreds of screens and fishways.

Has watched the disposition of factory and other waste products, instituting prosecutions and otherwise striving to abate known causes of damage.

Has removed rocks, timber blockades and other obstructions in a number of streams in northern California.

Has transplanted hundreds of thousands of trout, black bass and striped bass from overflow waters along the coast and in the interior valley.

Has been one of the first commissions in the country to provide its patrolmen with motorcycles, thus reducing transportation expenses and greatly increasing efficiency of force.

Has perfected a coöperation of effort with the U. S. Forest Service, whereby the State secures without cost the services of over 400 highly trained officers, almost all of whom are located in the best fish and game regions.

Has from the head office alone written or issued about 25,000 individual letters, 50,000 copies of circular letters, 325,000 abstracts, or synopses of the fish and game laws, 12,500 game law posters, 8,000 copies of the Board's compilation of the fish and game laws, thousands of copies of the several bulletins and reports already issued, and a great deal of other matter. (About 300 newspapers and periodicals in the State are on the Board's mailing list; to them all is sent each month a statement of the lion bounties paid for the previous month, another statement of the searches, seizures and arrests made by the different districts, and a statement of the Board's expenditures for the month past. If any of these statements are omitted for a month or more, a statement covering the elapsed time is issued.)

Has made studies of general fish and game conditions, and of fishing methods and apparatus, through the Superintendent of Hatcheries, the Assistant in Charge of Game Conservation, and other scientific assistants, and by deputies.

Has made a systematic study of the climatic and other conditions that determine the distribution of plant and animal life, with the idea of preventing the loss of effort, time and money that has occurred in the past through experiments in game introduction and transplantation that were not based on knowledge of vital facts.

RECOMMENDATIONS.

It will be noted that the Board offers no recommendations as to changes in existing legislation or the provision of new. The following quotation from a letter issued by the Board during the fall of 1911 sets forth fully the attitude of the present Commission and explains its deviation from an old practice:

> "It has often been said that the fish and game laws of the State of California were passed in the interest of a favored few, to the prejudice of the great mass of the citizens of our State.
>
> Such impression has gone forth, doubtless, by reason of the fact that the people generally have had but little, if any, voice in suggesting or proposing legislation upon the subject, resulting in lack of co-operation by the people with the Commission, without which co-operation neither beneficial laws can be passed, nor material progress be made.
>
> The Commission sincerely desires the active, hearty and earnest

> co-operation of all the people of this State in the great work which is before it.
>
> This Commission will be for the people, and it wants their expression as to the laws most suitable for their districts. In other words, it wants the people of the great State of California to say to the Commission, 'We want this and we want that,' and not for the Commission to say, 'We will give you this and we will give you that.'"

Such recommendations as may be found in this report are to be considered as representing the personal views of the specialists submitting them. The Board does not *necessarily* endorse any of them.

ACKNOWLEDGMENTS.

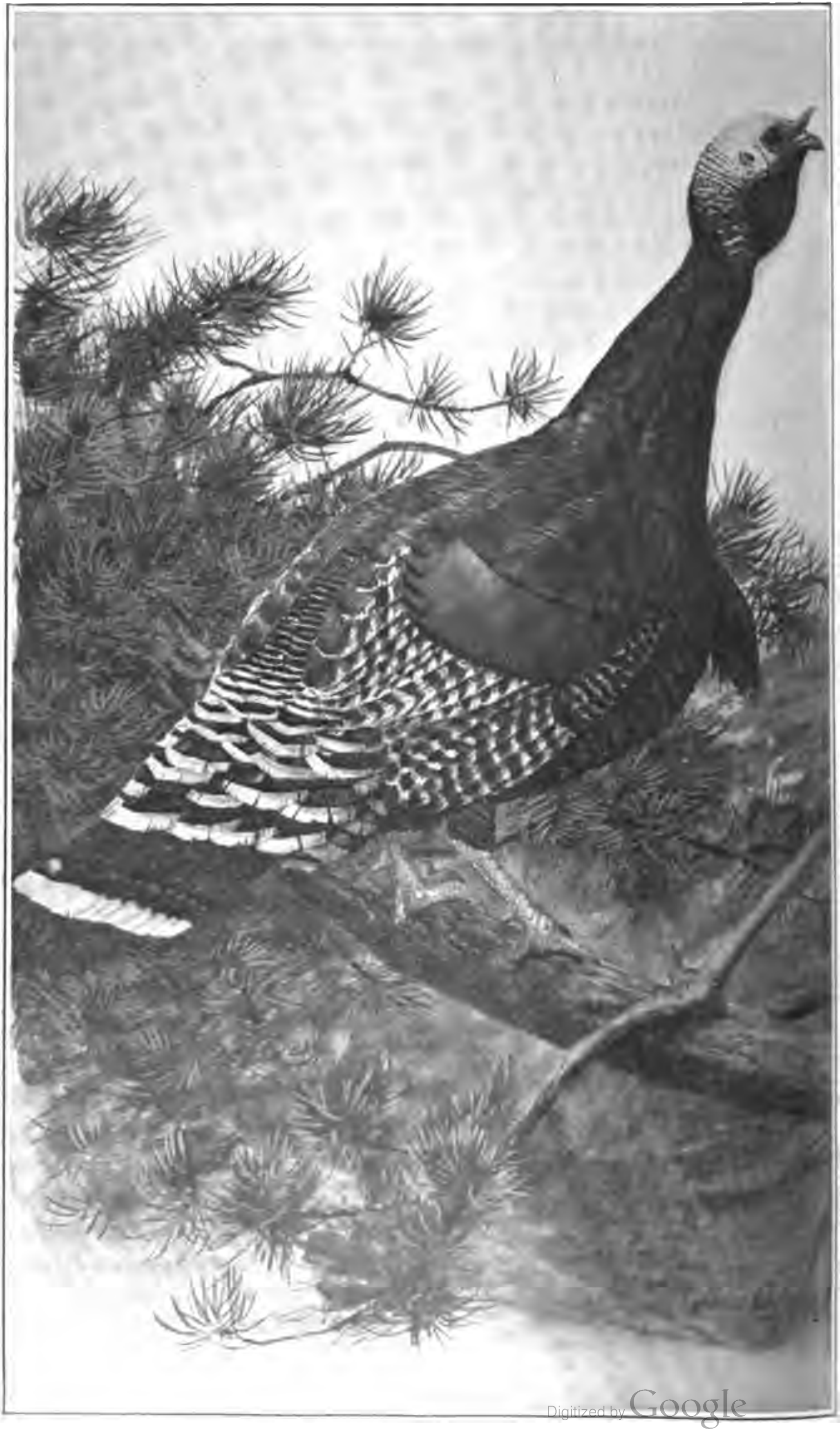
The Board desires to express its sense of deep obligation to the State commissions and departments, and to the universities, scientific institutions and individual scientists in the State and country, whose hearty support during the past two years has made possible the prosecution of many technical investigations. Particularly is the Board indebted to the University of California, the University of Southern California and to Leland Stanford Junior University, for not only support, but for active effort and the direction of difficult studies.

We wish also to thank, personally and officially, the many railroad and other transportation officials in the State, through whose unfailing courtesy the transportation of fish and attendants and special employees, has been possible. Without the free and reduced rate transportation of fish and fish eggs and game, that has been provided by the Southern Pacific, the Western Pacific, the Sierra, the Northwestern Pacific, the Lake Tahoe Railway and Transportation, the Nevada-California and Oregon and other railway companies and by the Pacific Coast Steamship Company and the Wells Fargo and Globe Express Companies, the distribution made by the Board would have been but a part of the gratifying total reported.

In concluding this report we desire to state that during the year that has just past every possible encouragement and assistance has been given by the public. Any success that may have crowned our undertakings must be credited to this favorable and growing sentiment.

Respectfully submitted.

F. M. NEWBERT, President,
M. J. CONNELL,
CARL WESTERFELD,
Board of Fish and Game Commissioners.



Mexican Wild Turkey (*Meleagris gallopavo*).

GAME CONDITIONS IN CALIFORNIA.

By J. S. Hunter,

In charge Game Conservation, Fish and Game Commission.

As a people we have been slow to realize the importance of the wild life of our country. Our love of hunting has caused the extermination of some our characteristic varieties of game. In our desire to have a full game bag to our credit, we have been reaching out to the more inaccessible places where game still approaches the conditions that were formerly common throughout the entire country. This desire to protect and cherish that with which we were so abundantly favored has not kept pace with the ability to kill; so that at the present time, there is in many of the states practically no game.

In our own State, while there is not an abundance of game, enough will still remain if judgment is used in the killing that the generations to come will find a state in which game still flourishes and in which the man who enjoys the most fascinating of all sports, may go into the field with his gun and dog and participate in the pleasure of his forefathers.

Our game animals are so valuable that the title to them has been retained by the State. Of late years, the right to take this game has been refused until a hunting license was secured. The law compelling a license has been one of the most popular that has ever been enacted, not only in California, but in every state in which it has been adopted. Millions of dollars are invested in our State in guns and other hunting paraphernalia. This sum has been variously estimated as reaching into nine figures. It is perhaps safe to say that it is not less than twenty-five million dollars. Add to this sum the amount that the score of clubs throughout the State have invested in land and buildings and it will probably total over one hundred million dollars. There are sold in California alone every year twenty-eight million shotgun shells. Every industry benefits from the fact that there is game in our State. Railroads run special hunters' trains during the open seasons. The opening of the season is made the feature of window displays throughout the State. Hotels and resorts, even small towns, owe their very existence to the fact that they are established in a game country. To a great extent, the sturdiness of the American people can be attributed to their love for hunting and outdoor amusements. A state in which game flourishes attracts people from all over the world. The value of land is increased by there being game upon it.

There are present in California so many different conditions of climate and topography that it is almost impossible to create a blanket fish and game law. When deer, for example, are in proper condition to be killed in one section, they are out of condition in another. Two years ago the legislature divided the State into game districts. Those selected were based upon artificial boundary lines without sufficient regard to natural conditions. In order to be satisfactory, districts must be based upon faunal, geographic and climatic conditions. In another part of this report will be found a suggestive districting scheme, which we believe will be far more satisfactory.

The present condition of game in the State is far from satisfactory. It is possible to secure the bag limit of any variety of game in any part of the State only with a great deal of difficulty. This is not necessarily due to the lack of enforcement of our present game laws, but to the fact that the seasons are too long, not rightly placed, that the number of hunters has been increasing year by year, and to numerous other causes.

DEER.

It is reported in many parts of the State that deer are on the increase. In view of the greater number of hunters, this is remarkable if it is correct; but it is doubtful whether careful investigation will uphold the current reports. There are probably killed in the State each year by hunters, 10,000 deer. Records were secured in 1911 of nearly 7,000, and it is safe to assume that at least 3,000 more were killed. It has been estimated that every mountain lion will kill at least 52 deer a year. Place the lion population at 250 and we can charge up 13,000 deer to lions. Coyotes and other varmints will without doubt bring the total number of deer killed up to the neighborhood of 30,000. In average years the natural death rate is not great; most of them meet violent deaths, so that 30,000 can be fairly accurately placed as the number of deer dead from all causes in the State.

ELK AND ANTELOPE.

Of the thousands of elk and antelope that formerly ranged in our State, we now have but a few scattered bands, feeble reminders to fill us with remorse for the protection we did not give such magnificent game. In the San Joaquin Valley near Button Willow and in the Sequoia National Park range are all that are left of the thousands of "tule" elk that formerly were found throughout the San Joaquin and Sacramento valleys. This species is peculiar to California. They now number between 400 and 500 head. It is reported that twenty odd years ago the band had decreased to less than twenty head. Since that time they have been given protection by the Miller & Lux Company and have now increased to their present number. On account of the size of this herd, it will soon be necessary for the State to take care of them, as no private interest can stand the expense of so great a number of large animals ranging at will through fences and over fields. The writer and Professor Grinnell of the University of California during the past summer visited this section of the State, and a plan was formulated which it is believed would result in properly caring for the "tule" elk. It is hoped that something along the lines suggested by Professor Grinnel in the following report, can be adopted:

BERKELEY, CALIFORNIA, June 13, 1912.

State Fish and Game Commission,
San Francisco, California.

GENTLEMEN: I submit herewith a statement in regard to the dwarf elk (*Cervus nannodes*), as it occurs at the present time in the San Joaquin basin. This information was obtain largely by Mr. J. S. Hunter and myself during the last ten days in April, 1912. During this period we explored the district west from Bakersfield, in Kern and San Luis Obispo counties.

According to the consensus of the accounts given us by old residents of the region, elk formerly ranged in considerable numbers throughout the Sacramento and San Joaquin basins, south to the immediate environs of Bakersfield, thence west through the inner coast ranges and intervening valleys as far as the plains of the Cuyama Valley, in San Luis Obispo County, and extreme northern Santa Barbara County. Before they had become much reduced in numbers, in the sixties, elk occupied most of the tule swamp region of the bed of the San Joaquin Valley. On this account this species of elk has been frequently called the "Tule" elk. The animal, however, ranged up into, and through, the barren ranges of hills all along the west side from west of Tulare Lake south to the vicinity of Maricopa.

By the year 1874 the elk had disappeared throughout nearly all of this territory. One report has it, that in 1874 but one single pair of elk remained between Tulare and Buena Vista lakes. These were on the property of Henry Miller. This gentleman decided to save this remnant if possible, and offered large rewards for information leading to the identity of any one molesting the animals. It is said that the fine herd of elk now existing, has descended from *this pair of animals preserved by Mr. Miller.*

The cause of the rapid decrease in the original numbers of elk is said to have been due to hunters, who make it a business to "jerk" elk meat, and sell it to prospectors on the desert.

It would appear that the dwarf elk never ranged outside of the lower Sonoran life zone within the San Joaquin-Sacramento basin. There was, however, a slight seasonal shifting. To this day, the does go up into the hills during the season when the fawns are born. At this time, too, bands of bucks range high into the hills, but not, generally, above the limits of the temperature conditions existing in the lower Sonoran zone.

The point I wish to bring out here is that this species of elk can not be expected to thrive if transported into any other faunal area than that in which it was originally native. There is no barrier to prevent the dwarf elk spreading high up into the pine belt of the Sierra, or even into the Mojave desert, or west into the coast district. But they did not go, finding the different climatic conditions prohibitive.

The rate of reproduction, that is, the rate of increase, of the dwarf elk is believed to amount to the doubling of the herd every four years, as long as conditions remain normally favorable. It is obviously, however, impossible for such a rate of increase to have been maintained since the original nucleus of the herd was first given protection. It is probable that there are good grounds for believing the numerous rumors, that there has been more or less poaching, even up to within a very few years.

Our investigations in April resulted in our belief that there are at the present time very close to 400 head of elk ranging from Buena Vista Lake to the vicinity of Button Willow and thence west into the elk hills; and as far as known, these are all of the representatives of the species in existence, save for a few which were removed in 1904 to the Sequoia National Park, and a very few in confinement elsewhere. The main herd remains a large part of the time on the valley lands belonging to Miller & Lux, and the Kern County Land Company.

There is no denying the fact that the presence of this great number of animals running at large, inflicts serious injury to these properties. We saw elk crowd *through* fences and trample fields of standing grain. I am informed upon good authority, that it is estimated that on the Miller & Lux property alone, $5,000 worth of damage is done each year by the elk, in breaking fences, and in trampling alfalfa and grain outside of what forage they actually consume.

The elk pay absolutely no attention to the ordinary cattle fence. We saw them go over both barbed-wire and rail fences with the greatest ease. The elk prefer, however, to crowd through if they can, as we observed in several cases.

The problem presenting itself for immediate action on the part of every one interested, is that of securing a permanent range. Everything points towards the rapid subdividing of the large land holdings into farms. No single owner can then stand the ravages of the elk. It is not for a moment to be supposed that any one advocates the unlimited protection of elk under the present conditions of rapid settlement of the California valleys. It is, however, consistent with the highest ideals of conservation that at least a representation of the animal be preserved in as nearly their native surroundings for all time. The steps leading to this consummation must be taken at once, while there is yet the opportunity of securing adequate areas of land in their native domain.

Nothing is more certain than that only failure can attend any attempt to move the elk from the limits of their native range. This was abundantly proven by the disastrous results of the "drive" of 1904 when the attempt was made to remove the entire herd to the Sequoia National Park.

The following suggestion has been made, as receiving favorable consideration by several persons qualified to judge, who are intimately interested in the problem: That three sections of land be acquired, one of these to be located in the bed of the valley between Buena Vista and Tulare lakes, the other two to lie to the westward. up into the elk hills. The first designated section should be of first class land (which is now valued in that vicinity at $100 an acre—$64,000 for the section). This section of arable land would have to be purchased or donated, but it is probable that the adjacent two sections of desert land could be secured under some sort of lease from the Federal Government.

The three square miles thus indicated would have to be completely fenced to keep the elk from doing depredations to the surrounding country. A special elk-proof fence would have to be constructed, and at a cost of $800 to $900 per mile. Such a fence would have to be at least seven feet high, and of such materials that elk could not break through. Of the arable section of land, at least 250 acres should be grown to alfalfa. This in connection with the native forage on the uplands would support about 500 elk.

It is suggested that further increase of elk could doubtless be disposed of from year to year for eating, or for stocking elsewhere. Such sale might establish the means of permanent support, to defray the salary of a man continually in charge, and the extra labor necessary in haying time.

The above brief outline for the establishment of a refuge for the dwarf elk I believe to be not only feasible but immediately necessary if we are to expect the preservation of this, one of the most interesting species of native game animal in California. It seems to me that the State Board of Fish and Game Commissioners could carry out the necessary details with much less difficulty than at the outset might be anticipated. Successful accomplishment would bring everlasting commendation for the far sightedness of this undertaking.

Respectfully submitted and recommended.

(Signed) J. GRINNELL,
Museum of Vertebrate Zoology.
University of California.

Besides the "tule" elk, another variety is found in very small numbers in the more humid parts of the State, in Humboldt and Del Norte counties. On account of the nature of the country, which is covered with timber and brush where this species range, it is difficult to accurately estimate their numbers. There are several small bands, numbering from six to twelve animals. It is safe to say that they do not total over 200 individuals. The people living in that part of the State are coöperating in ensuring these animals absolute protection, and it is to be hoped that they may be saved.

The antelope is more extensively distributed. A few are still found in the desert region bordering on the Colorado River in the extreme southeastern part of the State; some are also found in Antelope Valley, in the northeastern part of Los Angeles County, while in western San Joaquin Valley the largest band of the State is found. These number upwards of 150 individuals. In Modoc, Lassen and Siskiyou counties there are several small bands. All told, there are probably about 600 antelope left in the State. The antelope does not take well to domestic conditions. They tame easily, but up to the present time, no success has been had in the breeding and raising of them in captivity. The adult animals soon lose their vitality and in a few months will pine away. If some part of our State that is adapted to the antelope could be set aside as an antelope range, where they would be given absolute protection, it is believed that this species could be perpetuated. If such refuge should be established, it will be necessary to keep sheep from grazing on the land, as antelope and sheep will not get along together. As a rule, the land where antelope is found is almost worthless from the grazing or agricultural standpoint. The antelope is one of the most interesting of our North American game animals, and if by reasonable effort we can save them, we will be well repaid for our trouble.

MOUNTAIN SHEEP.

The mountain sheep still flourish in considerable numbers in the southeastern part of the State. Formerly they ranged over the entire Sierra Nevada region and across into the lower Coast Range as far north as San Luis Obispo County, but they now are restricted to the most inaccessible portions. Professor Grinnel of the University of California has about completed a report on the present status of this magnificent game animal. This report will probably be published shortly by the Commission.

BEAR.

Many of our most valuable animals as yet have received no consideration from the law. The grizzly bear is practically extinct. There are probably not half a dozen left in the State. The common brown or black bear is fairly abundant in some parts. It is for the most part a harmless species, feeding on roots, berries, grubs and insects. Rarely does a bear kill sheep or hogs. Occasionally a sheep-killing bear may be reported, but it is an exception to the general rule. They are naturally timid animals, only becoming vicious when wounded and cornered. The least unnatural sound will cause a bear to run for miles. The pelt of a well colored bear in prime condition is worth from $20.00 to $40.00. The law should not allow their being killed except when the pelt is prime.

FUR-BEARING ANIMALS.

Few people realize the importance of the fur-bearing animals in our State. Each year furs worth nearly $200,000 are shipped to the various fur centers. Under our present law none of the fur-bearing animals is protected. The killing of them is allowed in every season of the year. They are worthless during the summer months but exceedingly valuable during the winter. The killing of the more valuable and least predatory species should be prohibited when their fur is of no value.

WILD DUCKS AND GEESE.

The most abundant game birds in the State are ducks and geese, although neither of them are nearly as numerous as they were in former years. Ducks formerly bred in abundance throughout the entire State. Now, owing to the reclamation of land and also to the late spring shooting, the only species that breed commonly are the cinnamon teal and fulvous tree duck. These species leave the State during the fall months and are not heavily killed by duck hunters. The only places where other varieties breed commonly are in the lakes throughout the Sierra region.

There were killed in California last year approximately one million ducks. These birds cost the hunter at least fifty cents each. Some authorities consider that they cost a dollar. Even at fifty cents, it can be easily understood what the wild ducks are worth to the people of the State. Numerous species of geese are becoming exceedingly scarce. The practice of using live decoys and animal blinds has reduced their numbers to a very small fraction of what they were formerly. Experiments should be carried on to ascertain if the geese do the damage that is attributed to them. A certain amount of pasturing of young grain has been found to increase the crop. It is possible that in some of the grain fields of the interior, the work of the geese has increased rather than decreased the amount of grain produced. Without doubt, the killing of geese should be more restricted than it is at present.

SHORE BIRDS.

Our present law on shore birds is extremely ambiguous. The season should open and close for all species at the same time. The different species are not well known to most hunters and quite often a law-abiding man unconsciously violates the law. To allow the season for any water bird to run as late as the first of May is directly contrary to the advice of men who have made a study of spring shooting. Many of the shore birds are now on the verge of extinction and it would be well to consider taking them off the list of game birds. There is no more harmless group of birds in the State, so far as the agricultural interests are concerned, and from the standpoint of game most of them are not to be seriously considered.

QUAIL.

Quail are slowly decreasing throughout most of the State, on account of the great number of hunters and the development of facilities for getting into all sections where quail are found. One cause of the decrease of quail has been attributed to in-breeding. If there is any merit in this contention, the in-breeding can be attributed to the heavy shooting, reducing the number of birds to below the safety point. In parts of the State there is urgent need of a close season for a number of years if quail are to be kept from extermination. There is some hope that the experiments in domesticating quail, now being tried by parties throughout the State, may be successful. They are comparatively easily raised and would command a very good price from bird fanciers, if the sale were permitted. Mountain quail can probably be successfully raised above elevations of 2,500 feet. Experiments with them below that level have for the most part resulted in failures. Mountain quail have become very scarce throughout the southern end of the State, and in the coast region below San Francisco. In other parts of the State, although sometimes many of them are killed by hard winters, they are about holding their own.

GROUSE.

Ruffed grouse are fairly abundant in the extreme northwestern corner of the State. On account of the heavy brush and timber in which the birds are found, they are not hunted extensively. The blue grouse is becoming scarcer, and in all parts of the State where the settlers have engaged in sheep raising, they are almost extinct.

The sage hen is found only in the eastern part of the State, in the true sagebrush country. They have been greatly reduced where sheep have been ranged. It has been suggested that we endeavor to introduce the sage hen into Imperial County and other places of low elevation. It is probable that no success would be secured from any experiments of this sort, as the sage hen is practically never found below an elevation of 3,000 to 4,000 feet; neither is it found out of the true sagebrush country. The sage hen is our largest native California game bird and it is to be greatly desired that it be kept from extermination.

DOVES AND PIGEONS.

Perhaps the most difficult bird we have in the State to arrange a proper season for is the common mourning dove. Breeding records show that January is the only month in which they do not nest. No bird should be killed during the nesting season. On this account there are many sportsmen who advocate the removal of the dove from the list of game birds. If the proper season cannot be arranged, then this is what should be done. There is very urgent need for the protection of the wild (band-tail) pigeon. This is the slowest breeding game bird in the United States. One egg is the complete set, and probably only one egg is laid the entire year.

INTRODUCED GAME BIRDS.

Of the introduced game birds, those which have promised the best results are the ring-necked pheasants and wild turkeys. Pheasants have been liberated in various parts of the State where climatic conditions and topography were considered adapted to them. In many places very excellent results have been obtained. In Humboldt County, the birds have increased to a remarkable extent. They have also increased in parts of the Santa Clara and San Joaquin valleys. It will, however, be several years before the ring-necked pheasant can be considered abundant enough to be placed on the open list.

Wild turkeys have been liberated in the lower Sierra Nevada region, where they are reported to be doing exceedingly well. Other plants have been made in San Diego, San Bernardino, Monterey, San Benito, Alameda, Sonoma, Shasta, and Humboldt counties. Reports that have come in are very promising and we believe that before many years the wild turkey will be one of our most prized game birds. A report of the turkey plantings made in the southern Sierra, by Deputy A. D. Ferguson of Fresno, will be found in the Board's 1913 Game Bulletin No. 1.

Hungarian partridges have been given a good trial but as yet no success has been met with. There have been very few places where they have been seen in recent months. It is possible that the Hungarian partridge will show up in unexpected places and that we may yet have this bird permanently within our State.

GAME REFUGES.

As game becomes scarcer and hunters work farther and farther into the breeding country, it will become more and more essential that certain places be left where game can have an absolute refuge. From these refuges game will spread to the surrounding open country where the hunters may have a chance to secure a fair bag. The more numerous these refuges can be, the more game will there be for the people of the State. The benefits that are to be derived from a protected area of this sort are well shown in San Mateo County. In that county there are approximately 20,000 acres of Spring Valley Water Company land. On this land there is practically no hunting. The deer are undisturbed here at all times. In the fall of the year the bucks begin to travel and may be found in every part of the county. During the present year there were killed about 154 bucks. Were it not for the Spring Valley preserved land, it is safe to say that not one tenth of this number would have been taken. If a game refuge could be established in every county in the State, we would be sure of a perpetual supply of game. There are many places that could be easily acquired at present, but as more settlers work in it will be more and more difficult, so that the time to commence is now.

GAME REARING.

In this connection it is well to say a word concerning domestic propagation of game. As it becomes more and more necessary to remove all the wild game from the markets, the public demands something to take its place. This can well be supplied from that raised in captivity. We have thousands of acres of land in this State that is excellent range for deer and upon which few of our domesticated animals can survive. This land, when properly fenced, would bring in a steady income as deer farms. Venison is one of the most delicious of all meats, and would command a high price at all times. The writer is informed by one of the leading butchers of San Francisco that he could secure from $1.00 to $1.50 per pound for all the venison he could obtain. Both deer and elk are readily domesticated. A law allowing the sale of such animals would not make it any more difficult to protect the wild animals; on the other hand, it would supply the demand for venison and would remove the reason for violating the law that sometimes exists under our present system. Not only can big game be domesticated, but quail, wild ducks and other game birds can be profitably raised. It would be well for our State to adopt a law something similar to that in force in New York, which allows the raising of game and the sale of all wild game other than that native to America.

CROP DAMAGE BY GAME.

There are parts of our State where deer and small game do considerable damage to growing crops. At present there is no provision in our law that allows the killing of such animals, nor is there any provision made for the payment of damages to the owner of the crops. It would not be wise to allow the killing of game animals on account of the very numerous parties who would take advantage of the opportunity to kill game at all seasons of the year, so that some system of appraising the damage done and the compensating of injured parties is the only solution.

PREDATORY ANIMALS.

The worst game destroyers that we have are the mountain lions, coyotes and bobcats. The lion works chiefly on deer; the coyote and cat on fawns and small game. It seems impossible to devise a bounty law through which the State would not be robbed. Almost every state in the Union has tried it at different times, and nothing but failures have resulted. All these species of "varmints" do damage, not only to the game of the State, but to the stock and poultry interests, so that it would not be fair to pay a bounty out of the game protection funds entirely. If any sort of a system is devised, the money should be taken from the general fund of the State.

A sum of money could be placed at the disposal of the Fish and Game Commission, out of which a number of expert trappers could be paid—these men put to work systematically in parts of the State where "varmints" are most abundant. The wages of such trappers need not be great, as the men could be allowed to retain the pelts taken. By a strenuous campaign it would be possible to bring the "varmints" to below the danger point, and enough game and stock would be saved each year to more than pay for the money expended.

OPERATION OF STATE GAME FARM AT HAYWARD.

By WM. N. DIRKS, Superintendent.

I herewith beg to submit my report as Superintendent of the State Game Farm, for the season of 1912.

On account of the unsatisfactory results obtained in years past, when all eggs were hatched under the domestic hen, it was decided to learn if more satisfactory results could not be obtained by the use of incubators. A great deal of time was spent in reading what various authorities have written on this subject; but it was found that their reports were more or less contradictory, and that only in a general way could they be relied upon. It was then determined to go ahead with actual experiments.

Pheasant chicks watering.

Various makes of incubators were tried and all were found to give about the same general results. Eggs were first placed in the incubator during March. Out of 13 eggs but 5 hatched—a percentage of a little over 38. Of the next lot of 517 eggs, 367 hatched, or nearly 71 per cent. Three other lots were tried, with poor success—only 40 per cent hatched.

It was then decided to set the eggs under hens for a number of days.

before transferring them to the incubators. Of the first lot of 1,100 eggs so placed, 822 hatched—a greater percentage than had been secured by the use of the incubator alone. Even better results were obtained later; out of a lot of 500 eggs, 411 were hatched, or 82 per cent.

It is a general complaint among pheasant breeders that the eggs laid toward the end of the season are weaker in fertility than those laid earlier. This has not been the case with the eggs hatched at the Game Farm during the past season; for of the last 123 laid, 100 were fertile.

It is planned, for the next year, to carry on experiments in coöperation with the State University, at the State Farm at Davis, to see if satisfactory results can not be obtained with incubators alone, thus abandoning the use of hens.

Pheasant chicks in brooder yard at Game Farm.

Although the trial with incubators has not met with the success that was hoped for, the artificial brooder, on the other hand, has given entire satisfaction, and has proved to be far ahead of any natural method for the raising of birds in large numbers. The brooder-house is a building divided into five compartments, opening into screen runways, 8 feet wide by 90 feet long. At one end of the building a furnace is set in a shallow pit, and leading from it a terra cotta pipe laid in a trench runs the entire length of the building. This pipe is boxed in, and covered with sand. By this arrangement a very even temperature can be maintained at all times.

The young pheasants are removed from the incubator as soon as dry. When the hatch is irregular, the older chicks may be taken out several hours in advance of the smaller ones, without harmful results.

Food is placed in reach of the little fellows within a few hours after they are taken from the incubator. For the first few days they are given a boiled custard, made in the proportion of six eggs to a pint of milk; after a day or two a small amount of cornmeal is added to this custard, and later, corn grits and fresh chopped beef. Hemp, mustard, and canary seeds are also scattered in the pens, and after the chicks are a month old, wheat and charcoal are added. Sand and green food, such as lettuce, kale, and clover, are placed within reach of the birds at all times.

Valley quail in pen at Game Farm.

After five weeks in the brooder, the birds are strong enough to be transferred to outside pens, and almost any time after they are eight weeks of age they are ready for liberation. About this time, there is a tendency to pick each other's feathers, with the result that as soon as blood shows, the injured bird becomes an object of attack by all the other birds in the pen, and in most cases is killed.

In securing eggs, the breeding birds were confined in small pens—

one male to five hens, except in two pens, where eight and ten hens respectively were confined. From both of these pens eggs were taken equaling in fertility those taken from the pens in which there was a lesser number of female birds. Experiments along this line will be carried on during the next summer.

In raising pheasants it is very important to guard against the young birds' getting hold of any of the burrs of the burr clover, as these burrs lodge in the throat and if not removed—an operation that can be performed with the aid of a small pair of physician's forceps—will cause death.

On account of the difficulty of securing valley quail for breeding purposes, a fair test was not made with these birds, though it is believed that they can be easily raised. Of the few eggs secured, 90 per cent of those that were fertile hatched. As soon as hatched the chicks were put into a fireless brooder made of feather dusters. Ninety were raised out of 181 hatched. Extensive experiments in the raising of valley quail will be carried on during the next year.

No success attended experiments with the Gambel or desert quail. All but three of the female birds died, and on dissection it was found that although eggs had developed, owing to some unknown trouble, probably due to a change in climatic or food conditions, the birds were unable to lay them. The male birds are more hardy and practically none have died.

No attempt was made to raise a great number of wild turkeys, as the stock at the farm has been greatly run down. These birds are easy to raise and should new breeding stock be secured next year a great many birds could be raised for liberation.

PROPAGATION AND DISTRIBUTION OF FISH, SEASON 1910-1911.

SALMON PROPAGATION.

In 1910, during the months of October, November, and December, the Fish and Game Commission received as usual from the U. S. Bureau of Fisheries, a grant of 24,126,000 salmon eggs which had been spawned at the Federal hatcheries at Baird, Battle Creek, and Mill Creek. These eggs were received and cared for at the State hatcheries at Sisson, Eel River and Brookdale.

Those hatched at Sisson were liberated in the tributaries of the Sacramento, near the hatchery, with the exception of 2,215,000 which were taken down to Redding and liberated in the Sacramento. Those hatched at the Eel River Hatchery were liberated in that stream within a few miles of the sea, and those hatched at Brookdale were planted in Scott Creek and the San Lorenzo River.

In addition to the above grant, 2,109,000 of silver salmon eggs were obtained through the joint operations of the Commission and the Bureau of Fisheries, on Klamath River, near Klamathon. The eggs of the silver salmon were shipped to Sisson and hatched there, with the result that 700,000 young silver salmon were planted in Klamath River and 719,000 in the Sacramento River. This was the first effort made in this State to increase the runs of the silver salmon; heretofore hatchery propagation having been confined to the Quinnat, or Sacramento salmon.

The silver salmon, commonly called "Coho" in the north, apparently does not enter either the Sacramento or the San Joaquin rivers. There is no known reason why the fish should not enter these streams; they run abundantly in the Klamath and the Smith rivers, in Del Norte County; they are taken in considerable numbers in Eel River, in the fall; and they frequent many other of the coast streams, as far south as Monterey Bay. Strange as it may appear, the presence of the silver salmon in the waters of this State remained unnoticed until Dr. Gilbert, Professor of Zoology, at Stanford University, a few seasons ago called attention to them. Heretofore, all the salmon taken in our rivers have been commercially classed as Quinnat. The silver salmon—though a true Pacific salmon—is not considered as valuable a fish as the Quinnat; they are smaller, run late in the fall, and are lacking in color and in oil. Nevertheless they are an excellent food fish when taken as they enter the rivers from the sea. Though the silver salmon run neither into the Sacramento nor the San Joaquin rivers, as an experiment the Commission planted 719,000 in the Sacramento, at Redding, with the hope of establishing a run in that river of these desirable fish. The outcome of the experiment will be watched with interest.

TROUT EGG COLLECTION AND DISTRIBUTION.

During the winter and spring of 1910–1911 the Commission obtained from the stock fish in the breeding ponds at the Sisson hatchery, the following numbers of trout eggs:

Loch Leven trout	1,200,000
Rainbow trout	1,100,000
Eastern Brook trout	750,000
	3,050,000

In addition to the eggs collected from the stock ponds at Sisson, two spawning stations were operated on the Klamath River, for the collection of wild rainbow trout eggs; these stations obtained 2,500,000 eggs, which were eyed and shipped to the Sisson Hatchery. A station for the collecting of steelhead trout spawn was also operated at the Snow Mountain Power Company's dam, in Eel River, and 1,900,000 eggs were collected there, 300,000 of which were paid to the California Trout Farm Company, which holds the leases for operating at that dam. Three hundred thousand of the eggs taken at the latter place were shipped to the State hatchery at Grizzly Bluff, on Eel River, in Humboldt County, where they were hatched. The fry from this lot were distributed in that county. Seven hundred thousand of the eggs were shipped to the Ukiah Hatchery, which the Commission held under lease. This lot supplied fish for Mendocino, Sonoma, Marin and Lake counties. The balance of the eggs was shipped to Sisson, where they were hatched and planted in public waters. The Commission also operated the Scott Creek spawning station, owned by the county of Santa Cruz, upon a lease, under the terms of which the county hatchery at Brookdale was furnished 500,000 eyed steelhead trout eggs, from a total of 1,300,000 steelhead eggs taken at this station, 600,000 of them being shipped to Sisson, to be used in stocking public streams.

Owing to unfavorable weather conditions, only 130,000 steelhead trout eggs were collected at Grizzly Bluff, Humboldt County, but the output of that hatchery was increased by the shipment already mentioned.

In all, 5,800,000 steelhead trout eggs were collected during the season.

The season at Tahoe was much later than usual, owing to the excessive snow fall of the previous winter. Operations were begun there in May and 3,000,000 Tahoe trout eggs were collected, which were hatched at the Tahoe and Tallac hatcheries and planted in the lakes in the immediate vicinity.

The hatchery at Wawona, Yosemite National Park, was operated as usual, with eggs shipped from Lake Tahoe.

The total number of trout eggs collected for the year amounted to 11,980,000.

(This report is taken from a bulletin issued by the Board in 1911.—SECRETARY.)

REPORT OF SUPERINTENDENT OF HATCHERIES.

Honorable Board of Fish and Game Commissioners,
for the State of California.

GENTLEMEN: I take pleasure in submitting my report of the work done at the Sisson Hatchery and other State hatcheries during the season from December 1, 1911, to November 1, 1912; and also of my work as Superintendent of Fish Culture and Distribution. I have made monthly reports of all this work, which covered in a comprehensive way everything that was being done under my supervision. I shall, therefore, endeavor to cover in this report only such matters as will be of interest to the public or those especially interested, but perhaps less informed than your honorable Board.

The work in general is in a most satisfactory and prosperous condition, due in a very great measure to the substantial support and coöperation I have received from the Board of Commissioners. I have been in the employ of the Commission for almost thirty years, and this is the first time during that period that I have received the hearty coöperation of the entire Board. I attribute in no small measure the success of the past season to this source, and I am deeply grateful for all the encouragement and material assistance thus given.

THE SISSON HATCHERY.

The excellent condition of the buildings and surroundings at the Sisson Hatchery enabled us to escape the usual heavy expense of the past few years of the building of new structures. The fences had a new coat of paint, as did also the exterior of hatchery "A," and all of the troughs in each hatchery were newly painted. A few new flumes have been built, and new gravel bottoms have been put in some of the ponds. A great deal of ugly brush has been removed, thus putting the ponds in a neater looking, as well as more sanitary condition. The roofs of all the buildings were repaired and a new motor was installed in the feed house.

At Bogus, Shovel and Camp creeks, small egg collecting stations under the supervision of this hatchery, the buildings, traps and screens were given a thorough overhauling and at Bogus creek an addition was built to the dwelling occupied by the men during the egg collecting season.

THE DISTRIBUTION CAR.

The distribution car also came in for its share of improvements. The boiler and air pumps especially were in poor condition and in April the car was sent to the Sacramento car shops of the Southern Pacific Railroad. The aerating system was improved by doubling the number of aerating plugs in each unit, thus insuring an abundance of oxygen in each can. The fish have carried better this season than ever before. Reports received from nearly all of the applicants made mention of the excellent condition of the fry at the time of delivery.

CREATION OF NEW OFFICE.

In November, 1911, the Commission saw fit to create the new office of Fish Culture and Distribution, and I was assigned to this new division of the work. I entered upon my new duties with great interest and enthusiasm. The work at first was somewhat heavy; but I was able with the excellent assistance given me, to effect a successful organization of this new department. The duties of this work required me to be away so much that the Commission very kindly furnished me with the valuable assistance of R. W. Requa who in April was made assistant superintendent of the Sisson Hatchery. He has very ably conducted the work of this station during my long occasions of absence while I was away on tours of inspection into every section of the State.

THE HATCHING SEASON AT SISSON HATCHERY.

The season for hatching here and at the substations has been unusually successful, and I submit herewith a tabulated list of the varieties and numbers of trout hatched:

LOCH LEVEN TROUT.

Eggs taken	1,500,000
Loss in eyeing and hatching	206,500
Left for distribution	1,293,500

EASTERN BROOK TROUT.

Eggs taken	1,000,000
Loss in eyeing and hatching	94,000
Left for distribution	906,000

RAINBOW TROUT.

Eggs taken from hatchery pond fish	1,087,000	
Loss in eyeing and hatching	97,830	
Left for distribution		989,170
Eggs taken Bogus Creek Station	2,455,400	
Loss in eyeing and hatching	280,000	
Left for distribution		2,175,400
Eggs taken Camp Creek Station	2,181,600	
Eggs shipped to Wawona Hatchery	225,000	
Loss in eyeing and hatching	262,700	
Left for distribution		1,693,900
Eggs taken Shovel Creek Station	1,370,000	
Loss in eyeing and hatching	177,800	
Fry planted in Shovel Creek	100,000	
Left for distribution		1,092,200
Total		5,950,670

STEELHEAD TROUT.

Eggs received from Brookdale	416,600
Loss in hatching	55,600
Left for distribution	361,000

Large Lake Trout—(*Salmo m. tahoensis*).

Eggs received from Tahoe	92,922
Loss in hatching	8,922
Left for distribution	84,000

Black-spotted Trout—(*Salmo m. henshawii*).

Eggs received from Tahoe	370,164
Loss in hatching	51,664
Left for distribution	318,500

SALMON.

The salmon output, while not so heavy as in several previous seasons brought many pleasing results. Several experiments have been made and some 50,000 fish were marked in endeavors to find the most favorable points for the distribution of these fish. After years of investigation I am of the opinion that the only successful way to rear salmon is to hold them from five to seven months and then release them in our rivers before the flood season. At this age they are able to escape their enemies and take care of themselves until they have reached the end of their long journey to the sea. By releasing them early, when the temperature in the streams first lowers, and before the flood season, they depart for their natural waters under most auspicious circumstances, and with no danger of being carried by the floods into the overflow basins and left later to perish in the tule basins when the flood waters have receded.

The Federal Bureau is making arrangements to take the eggs of the Silver salmon at Klamathon this year. They will be hatched at the Sisson hatchery.

The output of salmon follows:

Eggs taken at Battle Creek Station and hatched at Sisson	5,890,000
Loss	105,145
Left for distribution	5,784,855
Hatched at Sacramento Experimental Station	450,000
Loss in shipping and hatching	92,300
Left for distribution	357,700

Following is a list of trout and grayling in the ponds at Sisson Station, November 1, 1912:

Loch Leven.

Adult	3,402	
Two year old	3,572	
One year old	10,500	
Fry	10,000	
		27,474

Eastern Brook.

Adult	4,078	
Two year old	4,490	
One year old	5,879	
Fry	17,500	
		31,947

Golden.

Yearlings	250

Grayling.

Fry	4,000

Hybrid Golden-Rainbow.

Adult	57

RAINBOW.

Adult	3,310	
One year old	2,000	
Fry	25,000	
Fry in Klink Lake	50,000	
Fry in Sisson Lake	75,000	
		155,310
Total		219,038

TAHOE HATCHERIES.

E. W. Hunt has successfully managed the hatcheries about Lake Tahoe for many seasons. He proceeded to the lake a little earlier than usual this year so as to be in readiness to take as many eggs as could possibly be accommodated at the Tahoe Hatcheries.

There has been a very large trout that entered some of the tributary streams of Tahoe to spawn. I believe these to be a different variety, if not a different species from the common black-spotted trout (*Salmo m. henshawii*) of Lake Tahoe. These large fish have never been artificially propagated, owing to the lateness of the season when spawning usually begins. It was my desire to procure a few thousand of these eggs and place the fry hatched from them in different waters to see if they attain the size and peculiar markings after they have come to maturity under different conditions that are attained in their native waters. These fish have been classified as the *Salmo tahoensis*.

Mr. Hunt succeeded in getting over half a million of their eggs. Of these 92,922 were shipped to Sisson and hatched, and have since been distributed to various waters. The remaining eggs at the Tahoe Hatcheries were hatched and distributed to various tributary streams of Lake Tahoe. I am waiting with a great deal of interest the results of the artificial hatching of these large trout and also the effects of transplanting them to foreign waters.

Another important feature in connection with the Tahoe work was the exchange of 50,000 rainbow trout eggs to the Verdi Hatchery in return for as many Eastern brook eggs. The Eastern brook eggs were hatched and at the age of eight months were in fine condition and were distributed. The rainbow eggs will be delivered to the Verdi Hatchery next spring.

After a very busy and successful season the Tahoe Hatchery closed on October 7th and Mr. Hunt, after a short vacation, proceeded to Sisson. The statistical report follows:

Black-spotted trout eggs taken		3,610,622
Large lake trout eggs taken		542,761
Total eggs taken		4,153,383
Eggs shipped to Sisson and Wawona	585,086	
Loss in eyeing and hatching	482,439	
		1,067,525
Fry planted as per distribution reports:		
From Tallac	1,617,072	
From Tahoe	993,137	
From Glen Alpine	475,649	
		3,085,858
Total		4,153,383

BROOKDALE HATCHERY.

The Brookdale Hatchery, which has hitherto been operated by Santa Cruz County, has recently been acquired by the State through a lease. Owing to a lack of funds for maintaining this hatchery, Santa Cruz County entered into an agreement with the State, turning over the station, in return for the delivery to that county annually of 500,000 steelhead trout eggs.

Mr. F. A. Shebley has managed this hatchery since its institution and has continued as its superintendent since it has been acquired by the State. The eggs which are hatched at Brookdale are taken mainly from Scott Creek. An insight into the history of this station is necessary, therefore, in order to fully understand the importance of what has been accomplished there.

Concrete dams were first placed in the creek in the fall of 1907 by Santa Cruz County at a cost of $650.00. The following spring 725,000 eggs were taken. To make it a well equipped egg-collecting station considerable more work was needed; but an insurance of enough eggs in future had to be guaranteed in order to justify the cost. The only way to obtain this assurance was to protect the small trout in a portion of the stream and lagoon from hook and line fishermen. Leases were therefore secured from owners of land on that portion of the lagoon and stream, whereby four miles of stream was acquired and closed to fishermen. Here the fish are protected until maturity. Results have shown that by protecting that portion of the stream an increase of two million eggs was secured this season over the first season and with no greater cost of operation.

In addition to the importance to which he has elevated this plant as an egg collecting station, Mr. F. A. Shebley deserves great credit for the study and experiments he has pursued regarding fish life; they are instructive and interesting and represent a vast amount of well spent time and thought.

The egg-collecting station at Scott Creek was enlarged so as to take an extra number of steelhead eggs. Shipments of these eggs were made from Brookdale to the Ukiah Hatchery, to the Eel River Hatchery for distribution in Eel and Mad rivers and other nearby streams. Shipments were also made to Sisson for distribution by car to Southern California waters. The remainder were kept at Brookdale for distribution to points in Santa Cruz County streams.

Further improvements will be necessary to increase the take of eggs this coming spring at Scott creek. The report of the season's work at Brookdale follows:

Total number eggs collected at Swanton, hatched at Brookdale	2,709,300
Loss	603,200
Left for distribution	2,106,100
Total number of eggs shipped to Ukiah Hatchery	470,000
Total number of eggs shipped to Price Creek Hatchery	400,000
Total number of eggs shipped to Sisson Hatchery	416,600
Two small lots to Sacramento Experimental Station	16,000
Fry planted Scott Creek	50,000
Fry planted Santa Cruz County	753,500

PRICE CREEK HATCHERY.

Mr. W. O. Fassett has continued in charge of the work at this important station and has directed it in an orderly, commendable manner; but a series of accidents have hampered the work here to a great extent.

In April a landslide damaged the flumes so much that the hatchery had to close. The eggs and embryo fish in the hatchery were planted in Price Creek. Several hundred dollars will be necessary to repair the water supply so badly damaged by the landslide.

It may be well to note that 100,000 salmon fry were liberated in Mad River this season. The people in this section were greatly pleased, claiming to have been entirely overlooked by former commissions. In response to a petition of the people of Arcata, a thorough study is being made of the conditions in Mad River relative to the propagation and distribution of salmon fry in that section. I believe that enough eggs can be taken to stock Eel River and Mad River, without planting there the eggs of the Sacramento River.

The report of the steelhead trout eggs taken and the early distribution on account of the landslide follows:

Eggs taken		218,000
Eggs received from Brookdale Hatchery		400,000
Total		618,000
Loss in eyeing and hatching		38,000
		580,000
Planted in Price creek:		
Embryos	454,000	
Eyed eggs	80,000	
Uneyed eggs	46,000	
Total planted		580,000
Salmon eggs received from Bureau of Fisheries		3,240,000
Loss		36,340
Left for distribution		3,203,660
Distributed in Mad River	100,000	
Distributed in Eel River	3,103,660	
Total		3,203,660

UKIAH HATCHERY.

As in several previous years, the work at Ukiah has been very capably handled by Mr. A. V. La Motte. The hatchery was repaired early in the season, and a motor was installed for a pumping plant, to insure a supply of water in case the supply in the creek should fail. The expense of purchasing the pump and wire for the power line transmitting the current to the motor was paid for by subscription by the citizens of Ukiah. The fish have suffered at this hatchery in former years on account of the failure of the water supply. The present season, however, has brought with it an ample supply of water, and the station has operated successfully for four months.

The work at this station, while not so extensive as at some of the other stations, is a credit to the Commission; Mr. La Motte deserves unstinted praise for the businesslike and creditable manner in which he has conducted the work and made his reports. The residents of this section are also entitled to the gratitude of the Commission for their generous coöperation and support.

The egg-collecting station on Eel River, Mendocino County, was not opened this season. The Marin County Trout Farm demanded 600,000 eggs for permitting the Commission to operate at the Snow Mountain Power Company dam, on which they hold a lease. The Commission considered the demand unjust and that granting it would be favoring private interests, so enough eggs were shipped to Ukiah from Brookdale to supply the streams in that section.

The following briefly sums up the output of this station:

Steelhead eggs shipped to Ukiah from Brookdale Hatchery	470,000
Loss of eggs and fry	36,542
Left for distribution	433,458

WAWONA HATCHERY.

The work at the Wawona Hatchery, superintended by Mr. F. C. Boyce, has been entirely satisfactory, and like that at all the other hatcheries, the season has been a busy one.

The eggs shipped to this station from the Sisson and Tahoe hatcheries hatched in good condition, and the fry were vigorous and healthy. Through the courtesy of Major W. H. Forsyth, superintendent of the Yosemite National Park, the fish were given a wide distribution through the Yosemite National Park and adjacent country during the month of July. The greater portion were distributed by pack animals in the lakes and streams of the Yosemite region.

The following report sums up the season's work at the Wawona Hatchery:

Rainbow eggs shipped from Sisson to Wawona	225,000	
Loss in hatching and rearing	8,994	
Left for distribution		216,006
Black-spotted trout eggs shipped from Tahoe to Wawona	122,000	
Loss in hatching and rearing	7,534	
Left for distribution		114,466
		330,472
Rainbow trout fry distributed	216,006	
Black-spotted trout fry distributed	114,466	
Total distributed		330,472

THE SACRAMENTO EXPERIMENTAL STATION.

During the fall of 1911 the Commission decided to carry on a series of experiments to determine whether the eggs of the quinnat salmon could be successfully hatched and the fry reared near the city of Sacramento. It was thought that if water could be found in which the eggs could be hatched without causing injury to the eggs and embryos, that a greater percentage of the fry would safely reach the ocean, than would be the case if they were all liberated in the upper reaches of the river near the natural spawning grounds. It was maintained that under the old system of liberating the fry as soon as they were able to swim, that a great many of them were devoured by predatory fishes, and others were carried into the overflow basins during years of flood.

Accordingly, the station at Sacramento was established. Mr. F. A. Shebley conducted the work in addition to his duties as superintendent of the Brookdale Hatchery. The experiments as carried on at Sacramento are of vital importance to the salmon industry. After experimenting with the water from a number of wells, a flow of water was found on the Sherburn tract that appeared to give average results in hatching. The fish hatched at this station were all released in the Sacramento River. Of these, 50,000 were marked. A close watch will be kept for the return of these fish when they return at maturity, to find out if a greater percentage return as mature salmon than those that are released on the upper reaches of the Sacramento River.

Nearly all of the fry that were liberated in the Sacramento River were floated in a screen cage by boat into the middle of the stream and there released. Mr. N. B. Scofield, however, took 500 in a floating box down the river, where they were held and fed for several weeks in brackish and salt water. They were not affected by the sudden change from fresh to brackish and then to the saline waters of the straits near the outlet of the bay. Mr. Scofield, who conducted the experiment, will furnish a report of the minor details of this work.

In order to accurately determine whether better results are obtained by hatching and releasing the fry nearer tidewater than are obtained under the old system, it will be necessary to operate this station for a number of years. A certain number of fry will be marked each year until conclusive results are obtained.

In the course of the experiments above mentioned and in the search for suitable water for hatching purposes, two wells were bored, and the water from other wells was also analysed and experimented with. The batteries or series of troughs used in these experiments were set up in the open near the wells and the pumping plants were installed temporarily. The best results were obtained from the well on the Sherburn tract. Here a battery of 40 troughs was set up on the levee, and the pumping plant installed in a small building of corrugated iron. As the work continues during the coming season it will be necessary that a tent or temporary building be erected over the hatching battery, and I respectfully recommend that these few improvements be made in order

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that the employees may be protected from the inclemencies of the weather. If the experiments of the coming seasons prove successful, then a permanent station should be erected and the work carried on extensively. A report of the eggs hatched and released follows:

Total number of eggs received from U. S. Commission, Baird, Battle Creek and Mill Creek		1,768,000
October 9—First experiment, eggs placed in experimental trough, Carmichael land; water being unfit. Loss	50,000	
October 21—Second experiment. Ohji well, 10,000 eyed eggs, 11,000 green eggs. Both lots hatched in good condition, making fine growth after feeding	21,000	
January 6—Third experiment. Levee well, water unfit. Poor results	200,000	
January 10—Fourth experiment. Used river water by pump. No results	50,000	
January 26—Reshipped to Sisson	450,000	
January 26—Loss in hatching and rearing balance of eggs with water taken from Ohji well	97,000	
January 26—Fry liberated in Sacramento River	900,000	
		1,768,000

MILL CREEK.

This station is the property of the Federal Bureau, but it was operated this year by the California Commission. Heretofore, the salmon eggs have been hatched largely at Sisson, and as the prospects were unusually promising for the season passed, it was feared the capacity of the Sisson Hatchery would be overtaxed. Accordingly, arrangements were made with the Federal Bureau whereby the State operated the Mill Creek Station. This station has many fine features, and is ideally situated for the hatching of salmon fry. Below the mill there is a millrace 25 x 30 and containing from 3,000 to 5,000 miners' inches of water. It is covered with medium-sized boulders and gravel, and here were distributed the surplus embryos and later the fry. It has proved to be a remarkably fine nursery.

Geo. L. Hopper has been in charge of the work at this station, and he has submitted the following report of the season's work:

Eggs turned over to the State	9,364,550
Loss	40,660
	9,323,890
Eggs shipped to Sacramento	607,000
Fry hatched at Mill Creek Station	8,716,890
Fry lost	53,660
Fry planted at Mill Creek	8,663,230

In addition, there were 11,000 green eggs delivered to Mr. Hunt before the State assumed charge of the operations here. There were also 150,000 eggs sent to Sacramento from Baird.

THE DISTRIBUTION SEASON.

The season of distribution has been a long one. The first shipments were of salmon fry and were made in March (1912). Since then the car and its crew under the management of F. McCrea, have been kept constantly on the move, with the exception of ten days in April, when the car was in the shops.

In August the water in the coast streams and southern California became so extremely low that trout distribution had to be discontinued for a time. The car crew then proceeded to collect and distribute black bass. This work was not altogether easy, but they managed to gather 1.750 of these fish. They were planted mostly in interior waters south of San Francisco, but there was one shipment each to Placer, Yolo, and Calaveras counties.

I have submitted to the Commission for publication, a complete tabulated list of all the fish distributed from Sisson Hatchery and the other hatcheries, and it will appear elsewhere in the biennial report. This I deem most important, because the people are not only interested in knowing how many fish are propagated and distributed, but they also want to know where they are planted. The list will satisfy all of these interested persons and will prove that the Commission is endeavoring to scatter its benefits equally amongst all sections of the State.

In a very general way this report covers the work at Sisson Hatchery and its auxiliary stations.

SCREENS AND LADDERS.

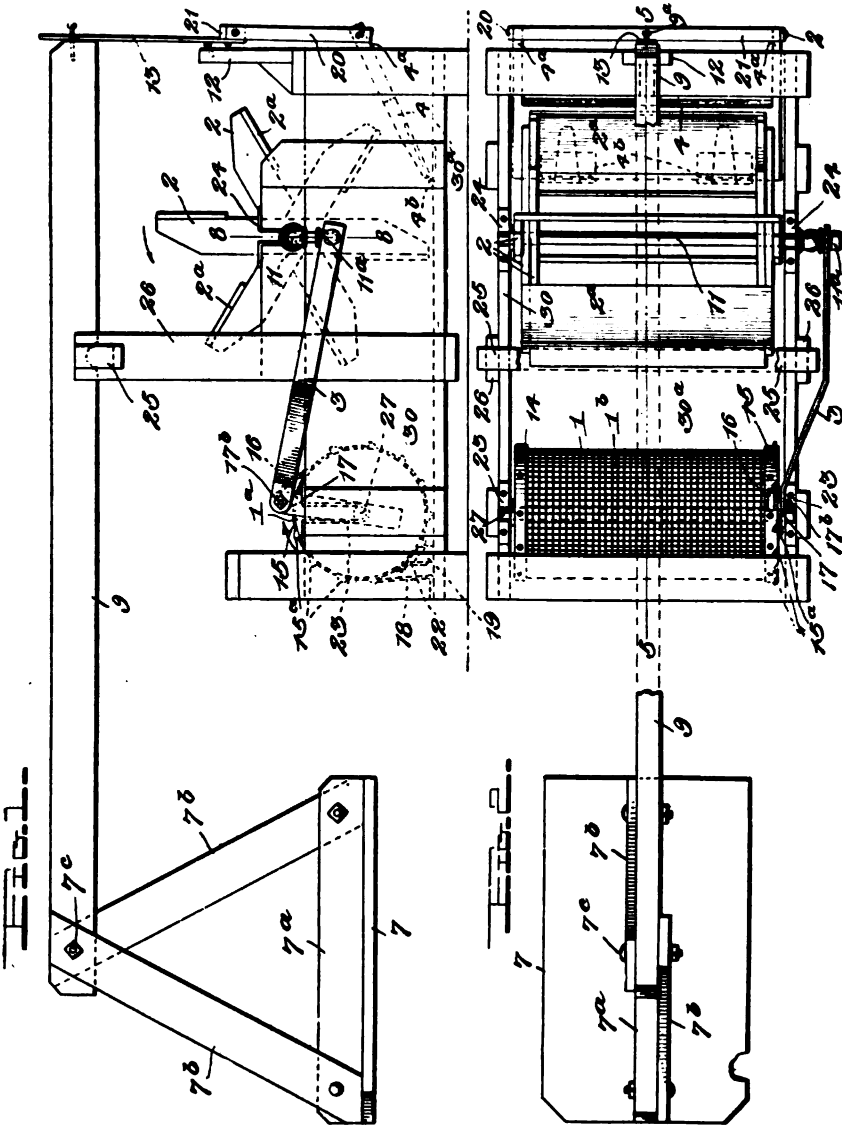
Acting under the instructions of your honorable Board, I began early in May, work on the fish "ladder" and screen investigation and the work of having necessary structures and appliances installed.

On my recommendation you appointed A. E. Doney as my assistant in the "ladder" and screen investigation. Mr. Doney has had several years of experience in the Klamath River work besides his duties as deputy in the northern part of the State. He has made a special study of the "ladder" work and has proven to be a valuable assistant.

We have visited most of the corporations, mill owners, irrigation and land companies and other water users, from Siskiyou to San Diego, in every county but two, and will have visited these two before this report is issued. On most occasions I have found them courteous and willing to install whatever screens or ladders were necessary.

There has been a screen law in California nearly twenty years and this is the first Commission that has insisted on its enforcement. The work in this line therefore has necessarily been slow. What has been neglected and lying dormant for so long can not be corrected in a month or even in a year.

It has been claimed by many who are familiar with the screen question, that the use of screens with meshes small enough to exclude trout fry would, in many cases, practically shut off all the water from the ditch or canal in which fry were placed. After a careful study of hundreds of ditches and canals and the matter that is carried into them, in the form of algæ, leaves and grasses, and floating material generally, I am firmly convinced that the parallel bar screens can be placed in all the ditches and canals without working a hardship or inconvenience on any person or company. When we first began this work we recommended the parallel bar screen and any of the rotary screens that the ditch owners desired to put in, so long as the meshes met the regulations of one quarter of an inch. Since then several engineers have planned



Partial Description of Self-Cleaning and Automatic Adjusting Fish Screen, designed by R. W. Requa, Sisson, California.

automatic self-cleaning parallel bar screens that can be installed successfully in any of the canals no matter how wide or deep they are.

Practical experiments have been made by Superintendent Requa at the Sisson Hatchery and he now has in operation there, two working models of self-cleaning rotary screens. He himself is the inventor of one, and he is entitled to the credit of making the best rotary screen that has ever been devised. Its most important feature is its absolute simplicity and inexpensiveness. It is so constructed that any farmer could make one in his work shop in half a day. I have neither the time nor the space to take up more fully the minute details of this screen. It is my intention to circulate information on this subject by separate folders.

This screen is designed for use in irrigating ditches, canals, or pipes taking water from streams, reservoirs, or other bodies of water.

The purpose of this invention is to provide a fish screen of simple construction, equipped with an automatic regulating device which will maintain a mean water level on the face of the screen under variable heads of water. The driving apparatus, including a crank shaft, pawl and rachet members, is designed for construction without special tools and at a nominal cost.

It may be well to add here that the regulation insisted upon requires that streams inhabited by trout, salmon, shad, and striped bass require screens with openings not greater than one fourth of an inch. In streams frequented by black bass, Sacramento perch and California "pike," and where there are no salmon, shad, trout, or striped bass to protect, an opening of one half an inch square is permissible.

I have found that the reluctance in screening is more with the engineers, superintendents or water masters, than the directors or real owners in land companies. Notice has been served to all water users that the law will be enforced. When a reasonable length of time has elapsed and no intention is shown to comply with the law, I shall request your honorable Board to instruct the Commission's attorney to begin proceedings to compel the obstinate ones to comply with the law.

In our study of the "ladder" question we are finding that most of the opposition to the construction of efficient fish "ladders" is not on account of the expense entailed in construction. In many instances, and particularly is it the case with large power companies, non-compliance is because they do not want to allow sufficient water to pass through the ladders to make them operative, so as to support and preserve the fish life in the streams below the plants. Several companies were public spirited and made it a rule to allow sufficient water to pass through their dams to keep the fish in good condition during the period of the minimum flow of water in the streams.

This work of the inspection and installing of "ladders" and screens will be most energetically pursued in the future, and I believe that another year will see satisfactory progress in this line.

EXPERIMENTS ON TRUCKEE RIVER.

Mr. F. A. Shebley and Mr. N. B. Scofield began a series of practical experiments on the Truckee River during the latter part of September, to determine if the refuse that passes into the river from the Crown Pulp and Paper Mill at Floriston is injurious to trout eggs and fry. The eggs and fry are being studied above and below the mill but the experiments have not yet been completed. A careful record is being kept of all the experiments, and so far the results of the experiments have been very conclusive. When the experiments are finished a full report of the results will be sent to your honorable Board.

RECOMMENDATIONS.

Besides the suggestions and recommendations that have already been made in this report, there are a few more that I deem it advisable to give at this time. They relate to the inauguration of a sea coast patrol boat, a southern California hatchery, discontinuance of planting eggs taken from the Sacramento River in other rivers, a general increase of hatchery work and a warning concerning the introduction of foreign fish.

SEA COAST PATROL BOAT.

On my trips of inspection in the southern coast counties, I interviewed a number of the more prominent fishermen, citizens interested in the preservation of the marine fishes, and the deputies in the seaboard counties, and from what I could learn regarding the condition from Monterey south, I am of the opinion that the Commission should have a motor boat for the sea coast patrol; a seaworthy boat that could stand the rough weather, so that the deputies could visit any of the islands from San Miguel Island south to Coronado Island. I believe that this is a very important measure for your honorable Board to consider, and I respectfully recommend that you give this your early and earnest consideration, so that the necessary recommendation can be made to the legislature for an appropriation to purchase a good seaworthy patrol motor boat to be used in the coast and island patrol.

SOUTHERN CALIFORNIA HATCHERY.

In my March report I recommended that the Commission investigate conditions in southern California, with a view to establishing a small hatchery in that end of the State. Pursuant to this recommendation, in company with Mr. E. W. Hunt, I made a trip in October through the southern California coast counties lying south of the Tehachapi Mountains. We examined a number of important sites and made a careful study of them to determine which was the best suited for the location of a hatchery to supply the southern California streams with trout fry. We found the San Antonio cañon in Los Angeles County to be the most favorable. At this site there is an abundance of pure water, free from algæ, organic matter, or any form of harmful bacteria or other deleterious matter. The site is just above the intake of the Sierra Power Company's pipe line in San Antonio cañon, on the south basal slope of Mount San Antonio. From the end of the electric car line to the hatchery site is six and one half miles of good road, over which a team or auto truck can convey the fish to the cars without difficulty. We were informed that the State could secure the hatchery site and the water necessary to operate the hatchery at a nominal sum. A lease for at least twenty-five years or a water right or deed for 40 inches of water and two acres of land would be necessary. We shall endeavor to get an option on this site and a statement of the amount asked for the land and water rights. If the same can be had at a reasonable figure, I would respectfully recommend that an appropriation be asked of the next legislature for the purchase of the site or a lease of same, as well as for the construction of the hatchery, pipe line, dam, cottage, and for the purchase of an auto truck.

This proposition is an important one. The rapidly increasing population of the southern part of the State makes it necessary to distribute a greater number of fry in that section each year, and the most economical way of doing it is to establish a hatchery there.

INCREASE OF HATCHERY WORK.

With the rapidly increasing population of California, I believe that proportionate increase should be made in the hatchery work, so that a larger number of fish can be liberated each season to meet the demands of the increasing population. Several varieties of food and game fishes from the eastern states should be introduced, as I have recommended in my monthly reports to the Board.

DANGER IN INTRODUCTION OF PREDATORY FISH.

I wish to call the attention of your honorable Board and the legislature to the danger of allowing any of the more predatory fishes from the eastern waters to be introduced into this State. I would respectfully recommend that the legislature make it a misdemeanor for any person, company or corporation to introduce, carry, transplant, distribute, or ship into the State of California any live fish or fish eggs without first having obtained a permit in writing from the Board of Fish and Game Commissioners. A number of persons have recently asked the Commission for some of the more predatory fishes to be placed in the waters of our own State. They mean to be interested and progressive and do not realize the great damage that can be done by introducing undesirable species. In my opinion a strict law should be passed covering the subject so that no one will ever be allowed to introduce species that would be injurious and probably exterminate the valuable food fishes that we already have and are endeavoring to propagate in future.

WITHDRAWING SALMON EGGS FROM THE SACRAMENTO RIVER.

I mentioned in the report on the Price Creek Hatchery, that I believe sufficient eggs can be taken from Eel River and Mad River to stock those rivers. Heretofore these rivers have been stocked with eggs from the Sacramento River. I believe that this should not be continued and

I think that the Commission should recommend that the Federal Bureau discontinue this work. The Sacramento is far too important a river commercially to have its supply of salmon eggs depleted by transplanting to other streams.

Following the general increase of the hatchery work I would recommend that the propagation of striped bass be taken up again. In my opinion, if skilled fish culturists with modern apparatus take up this very important work, practical results can be obtained, and the numbers of this valuable food and game fish can be greatly increased. The legislature should appropriate a special fund for this work, as it is of great economic value to the people.

We now have several thousand grayling fry in our ponds at Sisson Hatchery that we are rearing for breeders. We hope to be able to get enough breeders from these fry to give us a start, so that we can collect and hatch the eggs of this gamey fish for our mountain lakes and streams.

One of the more important improvements in the hatchery work would be the construction of a new and modern hatchery at Tahoe City. The old hatchery was erected in 1889. The building is old and out of date and too small to accommodate the number of eggs and fry that must be handled at this station to obtain good results in stocking the numerous lakes and streams in the Tahoe district. I would respectfully recommend that a special appropriation for this purpose be made by the next legislature if they wish to keep up and increase the work at this important station.

CONCLUSION.

This concludes my brief report of the work done at each of the hatcheries and their numerous substations. Generally speaking I believe it has been the most progressive year in the history of the Commission, more productive of good results and replete with every assurance of just as good if not better prospects ahead.

In the beginning of this report I expressed my deep gratitude to the members of the Commission for their very generous coöperation and support. I thoroughly appreciate the assistance of my superiors, but I must not overlook those over whom I have had general supervision. They have given to the Commission the best service possible at all times, working night and day when necessary, each performing his work and filling his own particular duty to the best of his ability. The hearty coöperation of my superiors and the competent assistance of the employees of this department have made this year the fruitful, progressive year it has been.

Respectfully submitted.

W. H. SHEBLEY,
Superintendent of Hatcheries.

November 1, 1912.

PART II—STATISTICAL.

CALIFORNIA FISH AND GAME COMMISSION ADMINISTRATIVE DISTRICTS.

San Francisco District.

Alameda County.
Contra Costa County.
Del Norte County.
Humboldt County.
Lake County.
Marin County.
Mendocino County.
Monterey County.
San Benito County.
San Francisco County.
San Mateo County.
Santa Clara County.
Santa Cruz County.
Sonoma County.

Sacramento District.

Alpine County.
Amador County.
Butte County.
Calaveras County.
Colusa County.
El Dorado County.
Glenn County.
Lassen County.
Modoc County.
Napa County.
Nevada County.
Placer County.
Plumas County.
Sacramento County.
San Joaquin County.
Shasta County.
Sierra County.
Siskiyou County.
Solano County.
Sutter County.
Tehama County.
Trinity County.
Yuba County.
Yolo County.

Los Angeles District.

Imperial County.
Inyo County.
Los Angeles County.
Mono County.
Orange County.
Riverside County.
San Bernardino County.
San Diego County.
San Luis Obispo County.
Santa Barbara County.
Ventura County.

Fresno District.

Fresno County.
Kern County.
Kings County.
Madera County.
Mariposa County.
Merced County.
Stanislaus County.
Tuolumne County.
Tulare County.

BOARD OF FISH AND GAME COMMISSIONERS.

Roster, January 1, 1913.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of the Governor. No pay.

Stats. 1869-70, p. 663; Pol. Code, Secs. 368, 642, 643.

F. M. Newbert, *President*, Sacramento	Appointed Aug. 3, 1911
M. J. Connell, Los Angeles	Appointed Feb. 1, 1909
Carl Westerfeld, San Francisco	Appointed Nov. 28, 1911
Ernest Schaeffle, *Secretary*, San Francisco	Appointed Nov. 29, 1911
J. S. Hunter	Assistant in Charge Game Conservation
W. H. Shebley	Superintendent of Hatcheries
J. H. Hoerl	Clerk to Superintendent of Hatcheries
R. D. Duke	Attorney

Head Office, San Francisco (734 Mills Building).

Under direction of Commissioner Carl Westerfeld.

Ernest Schaeffle	Secretary	H. R. Dunbar	Clerk
Arthur M. Fairfield	Assistant Secretary	E. McI. Rutter	Clerk
O. H. Reichling	Cashier	Mae D. Horn	Stenographer
Leo N. Pettit	Record Clerk	M. O. Vreeland	Stenographer

Los Angeles Office (510 Consolidated Realty Building).

Under direction of Commissioner M. J. Connell.

H. I. Pritchard	Assistant	E. A. McKee	Clerk and Stenographer

Fresno Office (347 Forsyth Building).

Under direction of Deputy A. D. Ferguson.

Lida H. Ransom	Stenographer

Sacramento Office (Forum Building).

Under direction of Commissioner F. M. Newbert.

Geo. Neale	Assistant	R. E. Cannel	Clerk and Stenographer

List of Regular Deputies, San Francisco District.

Alameda County.

J. L. Bundock	Oakland
Earle Downing	Pleasanton
Amos O. Stinson	Alameda

Del Norte County.

Paul Smith	Requa

Humboldt County.

Earl P. Barnes	Eureka
Theo. Benson	Fortuna

Mendocino County.

Wm. Ray	Laytonville
B. H. Miller	Ukiah

Marin County.

Sheridan G. Smith	Bolinas
Vernon D. Thomas	San Rafael
Herbert E. Foster	San Rafael

Monterey County.

Phil H. Oyer	Pacific Grove
Frank Shook	Salinas

Santa Cruz County.

J. H. Hill	Watsonville

Santa Clara County.

I. L. Koppel	San José

San Mateo County.

Frank H. Smith	Half Moon Bay

San Francisco County.

M. S. Clark	San Francisco
Ray B. Heacock	San Francisco

Sonoma County.

A. F. Lea	Cloverdale
Henry Lencioni	Santa Rosa

Patrol Launch "Quinnat."

H. B. Nidever, Captain	Headquarters, Vallejo
J. Christenson, Engineer	

Los Angeles District.

Inyo County.

E. H. Ober	Bishop

Orange County.

F. A. Forster	Capistrano

Riverside County.

Jas. H. Gyger	Perris

Los Angeles County.

I. A. Bordner	Long Beach

Santa Barbara County.

H. J. Abels	Santa Maria

San Bernardino County.

Jas. A. Vale	San Bernardino

San Diego County.

Webb Toms	San Diego

Ventura County.

Jas. A. Rasmussen	Ventura

Fresno District.

Kern County.

Tipton Mathews	Wasco

Fresno County.

S. L. N. Ellis	Fresno
F. A. Bullard	Dunlap

Stanislaus County.

J. E. Newsome	Newman
R. E. Shepherd	Merced

Tulare County.

E. W. Smalley	Hanford
D. H. Hoen	Visalia

Tuolumne County.

W. G. Scott	Soulsbyville

Sacramento District.

Amador County.

Fred Werner	Sutter Creek

Calaveras County.

David E. Roberts	Murphys

Colusa County.

S. J. Carpenter	Maxwell

El Dorado County.

Euell Gray	Shingle

Lassen County.

Frank P. Cady	Susanville

Napa County.

Wm. J. Moore	Napa

Modoc County.

John Todd Bonner	Alturas
Geo. W. Courtwright	Straw

Nevada County.

R. C. O'Connor	Grass Valley

Placer County.

S. J. Mandeville	Truckee
C. A. Scroggs	Loomis

Plumas County.

Geo. W. Chamberlin	Quincy

Sacramento County.

Wm. J. Green	Sacramento
C. H. Blemer	Sacramento

Siskiyou County.

Frank S. Parke	Yreka

Solano County.

Wm. H. Armstrong	Vallejo

San Joaquin County.

Richard Squire	Lodi
George J. Merritt	Stockton

Shasta County.

J. S. White	Castella

Trinity County.

G. O. Laws	Weaverville

Tehama County.

T. W. Birmington	Red Bluff

Yolo County.

R. L. Sinkey	Woodland
E. E. Wilgus	Winters

Special Investigators, Game Farm and Hatchery Employees.

Special Investigators.

Harold Heath (Mollusks)	Stanford University
N. B. Scofield (Salmon and Fishery Methods)	Sunnyvale
F. W. Weymouth (Crabs)	Stanford University
Willard E. Kay (Crabs)	Stanford University
H. C. Bryant (Game and Non-Game Birds)	University of California
Chas. L. Edwards (Abalone)	Los Angeles
Gretchen L. Libby, Educational Assistant	Riverside
Frank C. Clarke (Deer and Other Game Animals)	University of California
R. W. Requa, Assistant in Fishway and Screen Work	Sisson
A. E. Doney, Assistant in Fishway and Screen Work	Sisson
Chas. L. Gilmore, In Charge Stream Survey	Sacramento

Hayward Game Farm.

W. N. Dirks	Superintendent
David Fontes	Assistant

Fish Hatchery Employees.

Sisson Hatchery.

E. W. Hunt	Superintendent
F. McCrea	Foreman
E. V. Cassell	Assistant
C. Nixon	Inside Foreman
F. Sullaway	Outside Foreman
F. Clessens	Assistant
J. McManus	Assistant
Geo. McCloud, Jr.	Assistant
E. Clessens	Assistant
J. E. Winchcomb	Assistant
R. I. Bassler	Assistant
Wm. Hefferman	Assistant

Brookdale Hatchery.

F. A. Shebley	Superintendent
H. L. Nelf	Assistant

Swanton Egg Collecting Station, Scott Creek.

W. H. Rich	Deputy in Charge

Grizzly Bluff Hatchery, Eel River.

W. O. Fassett	Superintendent
N. F. Sisson	Assistant

Sacramento Experimental Salmon Station.

M. L. Cross	Superintendent
Geo. A. West	Assistant
Wm. Rogers	Assistant

INVENTORY OF STATE PROPERTY IN CHARGE OF FISH AND GAME COMMISSION.

Recapitulation Statement, June 30, 1912.

Office equipment, San Francisco	$2,204 05	
Office equipment, Sacramento	609 60	
Office equipment, Fresno	594 50	
Office equipment, Los Angeles	579 60	
		$3,987 75

Hatcheries.

Sisson Hatchery, including fish distribution car and equipment, cottage at Sisson, Shasta River Station, Shovel Creek Station, Bogus Creek Station, Camp Creek, material at Terry and at Thrall	$41,264 35	
Tahoe Hatchery	4,768 70	
Tallac Hatchery and cottage	4,823 10	
Tallac Spawning Station, cottage and cabin	680 79	
Glen Alpine Hatchery	36 05	
Scott Creek (Santa Cruz County)	1,218 80	
Price Creek Hatchery (Humboldt County)	2,840 55	
Sacramento Experimental Station	580 49	
Wawona Hatchery	86 00	
Ukiah Hatchery	83 65	
Bouldin Island Hatchery (stored, South End Warehouse)	125 00	
		56,507 48

Launches.

"Quinnat" and equipment	$5,712 90	
"Shad" and equipment	1,174 60	
"Audubon" and equipment	740 75	
		7,628 25

State Game Farm.

Equipment, cottage and tank house	$9,251 94	
Game birds and animals	2,242 63	
		11,494 57

Miscellaneous.

State property in charge of Commission employees		1,658 79
Collecting nets stored at Vallejo		126 00
Total		$81,402 84

REVENUES AND EXPENDITURES.

The following financial statement shows concisely and fully the sources and amounts of the funds coming into the Board's control since the filing of the last biennial report, with the channels and amounts of expenditures:

Balance on hand June 30, 1910		$73,318 21
Receipts.		
Sale of hunting licenses, 1910–1911	$143,265 00	
Sale of hunting licenses, 1911–1912	146,181 00	
		$289,446 00
Sale of commercial fishing licenses, 1910–1911	$23,595 00	
Sale of commercial fishing licenses, 1911–1912	23,545 00	
		47,140 00
Sale of wholesale fish and game dealers' licenses, 1911–1912		1,265 00
Fines paid into state treasury for violations of fish and game laws, 1910–1911	$15,941 30	
Fines paid into state treasury for violations of fish and game laws, 1911–1912	19,530 13	
		35,471 43
Sale of game and produce from Game Farm		2,097 80
Total		$375,422 23

Disbursements, Year 1910-1911.

San Francisco District—Salaries, traveling expenses, rentals, etc.	$86,803 60
Los Angeles District—Salaries, traveling expenses, rentals, etc.	16,407 40
Fresno District—Salaries, traveling expenses, rentals, etc.	14,145 85
Game Farm—Salaries, expenses, supplies, purchase of birds, etc.	10,805 64
Hatcheries and spawning stations—Salaries, traveling expenses, supplies	30,611 32
Distribution of fish (by car)—Salaries, expenses, supplies, etc.	4,802 61
Fish patrol (launches)—Salaries, expenses, supplies, etc.	12,811 02
Scientific investigations and publicity relating thereto—Salaries, expenses, supplies, etc.	5,814 38
Prosecutions and fees	7,492 35
Commissions on sale of hunting licenses and refunds	12,586 43
Bounties on California lions	5,420 00
Total	$207,770 80

NOTE.—During the year 1910–11 the San Francisco District included the counties now forming the Sacramento District.

Disbursements, 1911-1912.

San Francisco District—Salaries, traveling expenses, rentals, etc.	$49,885 54
Sacramento District—Salaries, traveling expenses, rentals, etc.	35,700 39
Los Angeles District—Salaries, traveling expenses, rentals, etc.	18,555 38
Fresno District—Salaries traveling expenses, rentals, etc.	21,390 68
Game Farm—Salaries, expenses, supplies, purchase of birds, etc.	8,228 84
Hatcheries and spawning stations—Salaries, traveling expenses, supplies, etc.	40,998 09
Distribution of fish (by car)—Salaries, expenses, supplies, etc.	5,561 58
Fish patrol (launches)—Salaries, expenses, supplies, etc.	6,046 01
Scientific investigations and publicity relating thereto—Salaries, expenses, supplies, etc.	8,806 65
Prosecutions and fees	9,245 37
Commissions on sale of hunting and fishing licenses and refunds	13,161 40
Bounties on California lions	5,680 00
Miscellaneous charges	6,910 46
Total	$230,170 39
June 30, 1912, balance in state treasury, after June bills were paid	32,634 68

(It is impossible to reconcile statement of license sales and other revenues for any year with statement of payments into and balances of state treasury, as collections are not all made during same fiscal year.)

It should be explained that an appropriation of $20,000.00 yearly for the support and maintenance of hatcheries, which was available up to June 30, 1910, has not been received since that time. In consequence of this loss, the fish cultural work of the Board has been seriously interfered with and will be more greatly impeded and injured within the next two years if the appropriation is not restored and in increased amount.

As the foregoing statement shows, the Board's receipts from all direct fishery sources—that is, from the sale of commercial fishing licenses and fines for the violation of fish laws—amounts to only $60,000.00 in round numbers for the biennial term. This amount is entirely insufficient to maintain the fish work of the State on a proper plane and can not properly be increased by diversions from the revenues derived from game and hunting sources.

According to Dr. T. S. Palmer, assistant chief of the U. S. Biological Survey, a Californian and recognized by competent authorities as being one of the foremost game conservationists of the world, this State presents a problem that is not faced by the fish and game commissions of any other state. The problem is unusual and great, not merely because of the great area and length of the State, with attendant geographical and climatic variations, but because of the numbers of species and extensive ranges of some of the most important members.

SEIZURES OF FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

July 1, 1910, to June 30, 1912.

	San Francisco district.	Sacramento district.	Los Angeles district.	Fresno district.	Total.
Illegally used fishing apparatus (nets and lines)	47	82		33	162
Salmon	146 lbs.			12 lbs.	158 lbs.
Striped bass	2,086 lbs.	355 lbs.			2,441 lbs.
Steelhead	671 lbs.				671 lbs.
Black bass		20 lbs.		139 lbs.	159 lbs.
Catfish	50 lbs.	333 lbs.		1,525 lbs.	1,908 lbs.
Trout	525 lbs.	100 lbs.		16 lbs.	641 lbs.
Crawfish	25 lbs.	40 lbs.	10 lbs.		75 lbs.
Crabs	1,774	135		60	1,969
Dried shrimp	586 lbs.				586 lbs.
Abalones		50	14 16 sacks 24½ sacks*		64 16 sacks 24½ sacks*
Clams	390				390
Miscellaneous fish	356 lbs.	20 lbs.	3,500 lbs.		3,876 lbs.
Deer meat	502 lbs.	399 lbs.	145 lbs.	130 lbs.	1,176 lbs.
Deer hides	47	3			50
Ducks	5,822		786	350	6,958
Quail	508		30	1	539
Doves	20			11	31
Plover, rail, snipe, etc.	105				105
Non-game birds	561			5	566
Pheasants				2 live	2 live
Tree squirrels	60				60
Rabbits	583	9	57	31	680

Illegally used fishing apparatus, after condemnation in superior courts, is destroyed by the Board; all wholesome fish and game is donated to public and charitable institutions, from whom many grateful letters of acknowledgment have been received.

NOTE.—Complete and accurate record of *seizures* kept and reported only since April, 1912.

*Sacks of shells.

RECAPITULATION.

Arrests—			
Fish cases		748	
Game cases		1,315	
Total			2.063
Convictions—			
Fish cases	505		
Game cases	1,116		
		1,621	
Acquittals and dismissals—			
Fish cases	200		
Game cases	193		
		393	
Pending cases—			
Fish cases	43		
Game cases	6		
		49	
Total			2,063
Fines imposed—			
Fish cases			$12,725 00
Game cases			23,993 50
Total			$36,718 50
Fines paid into courts—			
Fish cases			$11,415 00
Game cases			23,109 00
Total			$34,524 00

HUNTING LICENSES ISSUED—FISH AND GAME COMMISSION AND COUNTIES.

Counties.	Fiscal year 1910-1911.				Fiscal year 1911-1912.			
	At $1.00.	At $10.00.	At $25.00.	Total.	At $1.00.	At $10.00.	At $25.00.	Total.
Alameda	$6,946 00		$125 00	$7,071 00	$7,173 00		$100 00	$7,273 00
Alpine	50 00	$20 00		70 00	59 00	$50 00		109 00
Amador	992 00	10 00		1,002 00	950 00			950 00
Butte	2,731 00			2,731 00	2,878 00			2,878 00
Calaveras	829 00			829 00	1,116 00			1,116 00
Colusa	1,707 00	40 00		1,747 00	1,668 00	20 00		1,688 00
Contra Costa	1,474 00			1,474 00	1,610 00		50 00	1,660 00
Del Norte	322 00			322 00	292 00			292 00
El Dorado	955 00			955 00	1,001 00		25 00	1,026 00
Fresno	5,302 00	10 00	200 00	5,512 00	5,846 00	10 00	100 00	5,956 00
Fresno office	62 00			62 00	374 00			374 00
Glenn	977 00		50 00	1,027 00	1,102 00			1,102 00
Humboldt	3,452 00	10 00	100 00	3,652 00	3,296 00	30 00	125 00	3,451 00
Imperial	405 00			405 00	366 00			366 00
Inyo	930 00	80 00		1,010 00	915 00	10 00	25 00	950 00
Kern	4,649 00	10 00	75 00	4,734 00	4,964 00		75 00	5,039 00
Kings	1,342 00	10 00		1,352 00	1,246 00			1,246 00
Lake	1,194 00			1,194 00	1,218 00		25 00	1,243 00
Lassen	541 00	10 00		551 00	618 00	20 00		638 00
Los Angeles	15,028 00	120 00	150 00	15,298 00	12,886 00	100 00	150 00	13,136 00
Los Angeles office	2,931 00	110 00	125 00	3,166 00	4,892 00	40 00	50 00	4,982 00
Madera	727 00			727 00	764 00	10 00	25 00	790 00
Marin	856 00		125 00	981 00	608 00			608 00
Mariposa	300 00			300 00	341 00			341 00
Mendocino	1,680 00	10 00	125 00	1,815 00	2,235 00	10 00	250 00	2,495 00
Merced	1,704 00	10 00	75 00	1,789 00	1,753 00		175 00	1,928 00
Modoc	496 00	10 00		506 00	599 00			599 00
Mono	197 00	60 00		257 00	232 00	60 00		292 00
Monterey	2,217 00	20 00	50 00	2,287 00	2,046 00	10 00	25 00	2,081 00
Napa	1,840 00		150 00	1,990 00	1,881 00		125 00	2,006 00
Nevada	1,624 00			1,624 00	1,640 00		25 00	1,665 00
Orange	2,351 00			2,351 00	2,363 00			2,363 00
Placer	1,779 00		100 00	1,879 00	1,900 00		100 00	2,000 00
Plumas	515 00	30 00		545 00	493 00		25 00	518 00
Riverside	3,101 00	20 00	150 00	3,271 00	2,886 00	20 00	50 00	2,956 00
Sacramento	3,925 00	10 00	100 00	4,035 00	4,517 00	20 00	200 00	4,737 00
San Benito	996 00	10 00		1,006 00	1,045 00		75 00	1,120 00
San Bernardino	3,675 00			3,675 00	3,488 00	10 00		3,498 00

San Diego	3,493 00	20 00		3,513 00	3,631 00	20 00		3,651 00
San Francisco	760 00		125 00	885 00				
San Francisco office	13,588 00	150 00	1,100 00	14,838 00	13,038 00	70 00	1,125 00	14,233 00
San Joaquin	3,377 00		25 00	3,402 00	3,579 00		50 00	3,629 00
San Luis Obispo	1,444 00	10 00	50 00	1,504 00	1,368 00		25 00	1,393 00
San Mateo	1,720 00	20 00	25 00	1,765 00	1,623 00		75 00	1,698 00
Santa Barbara	1,644 00	40 00	75 00	1,759 00	1,800 00	50 00	50 00	1,900 00
Santa Clara	4,177 00	10 00	25 00	4,212 00	4,545 00		50 00	4,595 00
Santa Cruz	1,934 00		25 00	1,959 00	2,310 00	10 00	25 00	2,345 00
Shasta	2,240 00	20 00		2,260 00	1,935 00	10 00		1,945 00
Sierra	148 00			148 00	167 00			167 00
Siskiyou	3,126 00	70 00	75 00	3,271 00	3,218 00	30 00	125 00	3,373 00
Solano	1,917 00		175 00	2,092 00	2,315 00	10 00	150 00	2,475 00
Sonoma	4,734 00		225 00	4,959 00	5,455 00		275 00	5,730 00
Stanislaus	1,674 00		25 00	1,699 00	1,546 00	10 00		1,556 00
Sutter	860 00	20 00	25 00	905 00	873 00		25 00	898 00
Tehama	1,302 00	40 00		1,342 00	1,243 00			1,243 00
Trinity	793 00			793 00	668 00		25 00	693 00
Tulare	2,760 00	10 00		2,770 00	3,065 00	10 00		3,075 00
Tuolumne	1,052 00	10 00		1,062 00	1,069 00		25 00	1,094 00
Ventura	1,864 00	10 00	75 00	1,949 00	1,792 00	40 00	25 00	1,857 00
Yolo	1,644 00	30 00	25 00	1,699 00	1,856 00		100 00	1,956 00
Yuba	1,267 00	10 00		1,277 00	1,194 00			1,194 00
Totals	$138,410 00	$1,080 00	$3,775 00	$143,265 00	$141,551 00	$680 00	$3,950 00	$146,181 00

Total number licenses issued 1910-1911 .... 138,669 Total number licenses issued 1911-1912 141,777

COMMERCIAL FISHING LICENSES ISSUED.

April 1, 1910, to March 31, 1911—

Alien	$19,140 00
Citizen	4,455 00
Total	$23,595 00

April 1, 1911, to March 31, 1912—

Name of district.	Alien.	Citizen.	Total.
Lower Sacramento	$650 00	$462 50	$1,112 50
Upper Sacramento	10 00	287 50	297 50
Southern California coast	3,730 00	1,117 50	4,847 50
Bay district	800 00	67 50	867 50
Bay district	620 00	45 00	665 00
Tomales Bay district	180 00	110 00	290 00
Bay district	5,130 00	377 50	5,507 50
Bay district	620 00	20 00	640 00
Tahoe district	10 00	237 50	247 50
Monterey district	1,180 00	132 50	1,312 50
Humboldt district	260 00	102 50	362 50
Del Norte district	520 00	375 00	895 00
Bay district	390 00	12 50	402 50
San Joaquin district	20 00	15 00	35 00
Humboldt district	380 00	457 50	837 50
Humboldt district		7 50	7 50
San Joaquin district	10 00	7 50	17 50
Upper Sacramento district		12 50	12 50
All districts	4,135 00	1,052 50	5,187 50
Totals	$18,645 00	$4,902 50	$23,545 00

STATEMENT OF LION BOUNTIES PAID BY FISH AND GAME COMMISSION FROM OCTOBER, 1907, TO JANUARY 1, 1913.

Counties.	1907.	1908.	1909.	1910.	1911.	1912.	Total.
Alameda	-------	1	-------	-------	-------	-------	1
Amador	-------	3	-------	1	2	2	8
Butte	2	11	5	2	4	3	27
Calaveras	-------	1	4	1	-------	1	7
Colusa	-------	3	-------	3	3	1	10
Del Norte	-------	10	12	4	11	11	48
El Dorado	2	7	2	1	8	9	29
Fresno	-------	1	3	1	-------	4	9
Glenn	-------	13	6	6	1	4	30
Humboldt	10	113	67	71	42	50	353
Inyo	-------	-------	-------	-------	-------	1	1
Kern	-------	8	10	12	5	9	44
Lake	2	14	11	13	9	10	59
Lassen	-------	-------	1	-------	2	1	4
Los Angeles	-------	7	1	2	2	-------	12
Madera	-------	3	5	1	-------	1	10
Mariposa	2	4	3	6	2	1	18
Mendocino	5	44	18	11	16	17	111
Merced	-------	-------	-------	1	-------	-------	1
Modoc	-------	-------	1	1	1	-------	3
Monterey	-------	14	11	7	1	3	36
Napa	-------	-------	-------	1	-------	2	3
Nevada	-------	1	1	1	-------	-------	3
Orange	-------	-------	1	1	1	-------	3
Placer	-------	5	4	1	2	7	19
Plumas	-------	2	-------	3	-------	1	6
Riverside	-------	2	5	-------	-------	4	11
San Benito	-------	1	2	1	2	11	17
San Bernardino	-------	5	2	1	2	-------	10
San Diego	-------	3	5	5	8	3	24
San Luis Obispo	-------	11	5	9	4	4	33
San Mateo	-------	-------	-------	1	-------	-------	1
Santa Barbara	-------	7	24	7	3	5	46
Santa Clara	-------	-------	4	-------	-------	1	5
Santa Cruz	-------	-------	-------	1	-------	-------	1
Shasta	1	25	32	31	29	28	146
Sierra	-------	1	-------	-------	-------	3	4
Siskiyou	1	31	35	45	25	25	162
Sonoma	-------	-------	2	4	1	4	11
Stanislaus	-------	-------	2	-------	1	-------	3
Sutter	-------	-------	-------	-------	-------	1	1
Tehama	3	31	19	25	10	22	110
Trinity	9	86	34	32	22	15	198
Tulare	-------	6	8	11	4	5	34
Tuolumne	-------	6	10	5	2	4	27
Ventura	-------	1	6	4	6	2	19
Yuba	-------	1	-------	-------	2	-------	3
Totals	37	482	361	333	233	275	1,721

STATE GAME FARM, HAYWARDS.

Distribution of game birds, 1911.

	Pheasants.	Wild Turkeys.	Partridges.	Quail.
Sold for breeding purposes	200	33		
Given away for breeding and exhibition purposes	88			22
Released	100	400	44	
Eggs given away for breeding and exhibition purposes	358			60

STATE GAME FARM, HAYWARDS.

Distribution of game birds, 1912.

Alameda County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
1912.					
Mar. 20	Fish and Game Com.	Livermore		28[1]	
Mar. 21	C. A. Kofoid	U. C., Berkeley		1[2]	
Mar. 25	Fish and Game Com.	Sunol		14[1]	
Mar. 25	Fish and Game Com.	Livermore		13[1]	
Jan. 14	H. C. Cutting	San Lorenzo	5[3]		
Jan. 15	Mrs. Mathiassen	San Lorenzo	60[3]		
Jan. 21	Mr. Childs	Oakland	2[3]		
Feb. 4	H. C. Cutting	San Lorenzo	4[3]		
Mar. 19	County Infirmary	——— ———	1[3]		
Apr. 20	Dr. Harvey Baker	Berkeley		1[2]	
May 7	Mrs. Millette	Hayward			1[3]
May 7	Mrs. Millette	Hayward			1[3]
May 17	E. K. Strowbridge	Hayward	12 eggs[2]		
May 24	F. Russell	Alameda	14 eggs[2]		
June 7	J. W. Marvin	Livermore	50 eggs[2]		
Aug. 10	C. J. Smith	Oakland	2[2]		
Sept. 16	C. L. Crellin	Pleasanton	50[1]		

Del Norte County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Sept. 25	Paul Smith	Requa	100[1]		

Fresno County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Feb. 22	A. V. Lisenby	Fresno	3[4]		
Mar. 1	Fish and Game Com.	Sanger	40[1]		
Sept. 2	Fish and Game Com.	Sanger	100[1]		
Sept. 23	Fish and Game Com.	Dunlap	60[1]		

Humboldt County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Aug. 24	Earl P. Barnes	Eureka	100[1]		
Aug. 24	Earl P. Barnes	Eureka		50[1]	

Lassen County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Sept. 4	Frank P. Cady	Susanville	100[1]		
Sept. 21	Geo. Wingfield	Jamesville			50[1]

STATE GAME FARM, HAYWARDS.

Distribution of Game Birds, 1912—Continued.

Mendocino County.

Date.	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Mar. 5	Capt. Neilsen	Willits	3[3]		
Sept. 13	B. H. Miller	Ukiah	50[1]		
Monterey County					
May 24	Frank Shook	Salinas		2[1]	
Aug. 12	Phil Oyer	Pacific Grove	100[1]		
Napa County.					
Sept. 13	W. J. Moore	Napa	50[1]		
Sept. 18	John McCormick	St. Helena	50[1]		
Nevada County.					
Feb. 12	T. F. Hogan	Grass Valley	2[4]		
Sept. 18	Dr. I. W. Hays	Grass Valley		30[1]	
Placer County.					
Sept. 5	Montgomery Godley	Lincoln		25[1]	
Sacramento County.					
Jan. 24	Fish and Game Com.	Folsom		20[1]	
Oct. 7	Geo. G. Lacke	Walnut Grove	50[1]		
San Benito County.					
Feb. 13	Fish and Game Com.	Tres Pinos		25[1]	
Aug. 20	J. H. Hill	Watsonville		50[1]	
Sept. 9	J. Lee Jones	Tres Pinos	100[1]		
San Francisco County.					
Mar. 18	U. S. Marine Hospital	San Francisco		1[2]	
Mar. 19	Golden Gate Park	San Francisco	2[3]		
Sept. 18	Capt. C. A. Gove	Yerba Buena Isl.	25[1]		
San Mateo County.					
Jan. 22	J. B. Leonard	Menlo Park	12[3]		
Apr. 2	J. B. Leonard	Menlo Park	1[3]		
Santa Clara County.					
Jan. 25	R. W. Withey	Los Gatos	3[3]		
Feb. 12	F. S. Daniels	Mountain View		1[4]	
Mar. 18	R. W. Withey	Los Gatos			4[3]

STATE GAME FARM, HAYWARDS.

Distribution of Game Birds, 1912—Continued.

Data	Applicant.	Address.	Pheasants.	Wild Turkeys.	Quail.
Santa Cruz County.					
Aug. 13	Geo. Martin and H. C. Peckham.	Watsonville	50[1]		
Shasta County.					
Oct. 4	B. C. McCray	Redding		32[1]	
Solano County.					
Aug. 27	John Hollenbeck	Ryer Island	100[1]		
Sonoma County.					
Feb. 5	Thompson Bros.	Petaluma	3[3]		
Sept. 15	F. M. Child	Cazadero		25[1]	
Stanislaus County.					
Aug. 14	Geo. Prowse	Oakdale			1[3]
Sutter County.					
Feb. 15	Mrs. D. W. Chilson	Pleasant Grove	1[4]		
Tehama County.					
Jan. 17	C. C. Barrows	Corning	4[4]		
Tuolumne County.					
Jan. 23	Fish and Game Com.	Tuolumne		50[1]	
Tulare County.					
Sept. 2	J. D. Blick	Three Rivers	50[1]		
Sept. 2	Tom Jacobs	Visalia	25[1]		
Sept. 2	Porterville Game Protective Association.	Porterville	50[1]		
Sept. 23	Deer Creek Fish and Game Protective Association.	Hot Springs	40[1]		
	Totals		1,398 76 eggs	368	57

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[1] Released.
[2] Given for experiment.
[3] Exchange for other birds.
[4] Sold.

HATCHERIES.

Fish Distribution (Partial), Season 1911.

(Note.—Because of the loss of records during the absence from his office of Superintendent W. H. Shebley in 1911, only a partial statement of that season's distribution can be given.) (Secretary.)

Counties.	Black bass.	Rainbow trout.	Eastern brook trout.	Loch Leven trout.	Black-spotted trout.	Steelhead trout.
Alameda		10,000				345,000
Amador		16,000		6,000		
Butte		74,000	18,000	9,000		
Calaveras		72,000				
Contra Costa						8,000
Colusa		40,000	8,000			8,000
El Dorado		117,000	60,500	35,500	1,636,305	
Fresno		12,000		36,000		6,000
Inyo		60,000	37,000	43,000		
Kern	700	30,000		6,000		
Lake		24,000				68,000
Lassen		44,000	16,000	4,000		
Los Angeles	50	79,500				
Marin						65,000
Mariposa		54,000	20,000	50,000		
Mendocino						283,000
Modoc		48,000	20,000	14,000		
Mono		42,000	36,000	38,000		
Monterey		46,000				
Napa		52,000				44,000
Nevada		108,000	61,000	95,000		215,000
Orange	775	15,000				
Placer		174,100	113,000	50,500	758,446	
Plumas		75,000	40,500	126,000		
Riverside	*1,130					
Sacramento						250,000
San Benito		36,000				4,000
San Bernardino	*630	540,000				
San Diego		18,000				
San Mateo		32,000				434,000
Santa Barbara		36,000				
Santa Clara		64,000	2,000			110,000
Shasta		331,000		8,000		
Sierra		16,000	6,000		335,000	
Siskiyou		174,000	17,500	35,500		
Solano		10,000		10,000		12,000
Sonoma		20,000				
Tehama		96,000	4,000	4,000		
Trinity		22,000		12,800		
Tulare		100,000	20,000	250		6,100
Tuolumne		78,000	18,000	24,000		
Ventura		33,000				
Yuba		12,000				
Totals	3,285	2,810,600	497,500	607,550	2,729,751	1,858,100

*Adult.

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF LOCH LEVEN TROUT.

Applicant.	Number.	Waters stocked.	Month of delivery.
R. Belden	3,000	Indian and Yellow creeks, Plumas County	May
H. C. Chamberlain and others.	18,000	Homer Lake, Long Valley reservoir, and Wolf Creek, Plumas County.	May
W. C. Robinson	18,000	Bear, Buck, Mill, Big, Clear, Rock, Silver and Grizzly creeks, Plumas County.	May
M. H. Bernheim	12,000	Eureka, Grass, Jamison and Rock lakes and Jamison Creek, Plumas County.	May
Portola Improvement Association.	9,000	Willow, Humbug and Grizzly creeks, Plumas County.	May
Smith & Weil	6,000	Mill Creek and Three Lakes, Plumas County	May
Taylorsville Gun Club	12,000	Lights, Cooks, Indian and Grizzly creeks, Plumas County.	May
Quincy Gun Club	18,000	Spanish, Rock, Mill, Clear, Greenhorn, Taylor creeks and Middle Fork Feather River, Plumas County.	May
C. N. Johnston	12,000	Feather River and Smith Creek, Plumas County.	May
G. F. Edwards	12,000	Tributaries of Feather River, Plumas County	May
A. Machomich	6,000	Feather River, Sulphur and Willow creeks, Plumas County.	May
F. M. Rutherford	15,000	Truckee River, Schaffer and Alder creeks, Nevada County.	May
N. A. Hawkins	18,000	Shasta River, Siskiyou County	May
North Fork Game Protective Association.	12,000	Willow Creek, Placer County	May
J. B. Knapp	6,000	Canyon Creek and North Fork American River, Placer County.	June
Lake Tahoe Railway and Transportation Co.	18,000	Blackwood Creek and Truckee River, Placer County.	June
Nevada City Hunting and Fishing Club.	21,000	Deer and Rock creeks and Woods Ravine, Nevada County.	June
L. Y. Coggins	9,000	Dobkins Lake and North Fork Eddy Creek, Siskiyou County.	June
E. Meybem	12,000	Butte Creek, Butte County	June
Fred Werner	12,000	Sutter Creek, Amador County	June
City of Vallejo	30,000	Lake No. 2 and creek between Dam No. 1 and Dam No. 2, Solano County.	June
Fresno Division, Fish and Game Commission.	36,000	Tamarack, Maxwell, Log Cabin, Two Mile, Pingley and Red Can lakes, Tuolumne County.	July
Geo. F. Conlin	12,000	South Fork Stanislaus River, Tuolumne County.	July
R. B. Shaw and H. M. De Ferrari.	24,000	North and Middle forks Tuolumne River, Tuolumne County.	July
J. O. Bigelow	24,000	Basin Creek, Tuolumne County	July
D. E. Roberts	12,000	North Fork Stanislaus River and Beaver, San Antone and O'Neal creeks, Calaveras County.	July
H. M. Freeman	36,000	Three Loch Leven lakes, Placer County	July
Miss Katherine Chandler	12,000	Five Lakes and Bear and Squaw creeks, Placer County.	July
Al Tahoe Company	6,000	Trout and Cold creeks, El Dorado County	July
H. E. Cagwin	9,000	Upper and Lower Echo lakes, El Dorado County.	July
Santa Clara Fish and Game Protective Association.	24,000	Planted in the streams of Santa Clara County	July
G. F. Edwards	18,000	Gold Lake, Plumas County	July
H. L. Beecroft	6,000	Grizzly Creek and Ice Lake, Plumas County	July
Frank P. Cady	7,500	Susan River and Silver and Caribou lakes, Lassen County.	July
Geo. D. Campbell	2,500	East Creek, Modoc County	July
L. H. Sisson	2,500	South Fork Mill Creek, Modoc County	July
Ira Hansen	2,500	Parker Creek, Modoc County	July

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF LOCH LEVEN TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
Sisson Promotion Association.	18,000	Sullaway, Big Spring Creek and North Fork of Sacramento River, Siskiyou County.	July
Geo. Neale	6,000	Battle Creek, Tehama County	July
Fresno Division, Fish and Game Commission.	36,000	Barren Lakes of High Sierra, Madera County	July
W. P. Yaney	9,000	Longley, Horton, Birch creeks and Middle and South Forks of Bishop Creek, Inyo County.	July
A. L. Stewart	3,000	Wyman and Crooked creeks, Inyo County	July
Hall & McAfee	27,000	Baker, Big Pine, Little Pine, Birch and Tinnemaha creeks, Big Pine Lakes and Red Mountain Lakes, Inyo County.	July
A. Davies	9,000	Little Truckee River, Nevada County	August
A. Papa	18,000	South Yuba River, Placer County	August
J. S. Cain	6,000	Walker River, Mono County	August
A. G. McFarland	6,000	South Fork Yuba River, Placer County	August
Webber Lake Club	18,000	Tributary to Webber Lake, Nevada County	August
G. F. Zentgraff	12,000	Pilot and Bear creeks, El Dorado County	August
J. M. Amick	6,000	Mokelumne and Bear rivers and South Fork Cosumnes River, Amador County.	August
G. S. Wilson	12,000	Indian, Reddings, Browns, East Weaver and Rush creeks, Trinity County.	August
W. E. Tebbe	12,000	Island Lake, Siskiyou County	August
Geo. E. King	15,000	Woodruth and Rock creeks and North, East and South Forks Yuba River, Sierra County.	September
R. Colwell	5,000	Rubicon River and Rock Bound Lake, El Dorado County.	September
Jas. Bryson	12,500	Echo and Adrian lakes and American River, El Dorado County.	September
Glen Alpine Springs Company.	6,000	Glen Alpine Creek and Grass, Susie and Heather lakes, El Dorado County.	September
Mayo A. Greenlaw	9,000	Echo Lake, El Dorado County	September
W. W. Price	15,000	Witches' Cave and Floating Island, Cathedral, Upper and Lower Angora lakes and Glen Alpine Creek, El Dorado County.	September
Grass Valley Sportsmen's Club.	17,500	Clipper, Wolf, Rattlesnake, Dry, Squirrel, Nigger and Slate creeks, Nevada County.	September
Murphy Bros. and Morgan.	12,500	Bear, Hawk, Richardson and Granite lakes, El Dorado County.	September
Lawrence & Comstock	9,000	Floating Island and Angora lakes, El Dorado County.	September
Bert Berry	7,500	Poro Creek, Tulare County	September
Shaver Lake Fishing Club	35,000	Shaver Lake, Fresno County	September
Deer Creek Fish and Game Protective Association.	5,000	North and South Deer creeks, Tulare County	September
T. A. Chatten	7,500	Eagle Creek, Kaweah Creek and Franklin Lake, Tulare County.	September
W. A. Sperry	5,000	Grizzly Creek and Clover Valley, Plumas County.	September
Robert Belden	9,000	Entire shipment lost because of lack of care	September
Euell Gray	15,000	Cody, Right, Dolk, Blood, Succor, Echo and Adrian lakes and American River, El Dorado County.	September
Dr. C. S. Noble and others.	5,000	Lopez, Arroyo Grande and Tar Spring creeks, San Luis Obispo County.	September
A. D. Shepard	20,000	Castle Lake, Siskiyou County	September
Pacific Gas and Electric Company.	30,000	Lakes Spaulding and Fordyce, Placer County	September
Yosemite Valley Railway Company.	60,000	Merced River, Merced County	September
Major Wm. W. Forsyth	20,000	Merced River, Mariposa County	September

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF LOCH LEVEN TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
Jas. A. Vale	50,000	Lytle, Devoir, Cable, City, Plunge, Bear, Mill, Salfrit, Creeley, Deep, Huston, Grass Valley, Little Bear and Hook and Holcomb creeks and Devil and Waterman canyons, San Bernardino County.	October
B. L. Crise	5,000	Pauma Creek, San Diego County	October
Ed. Fletcher	7,500	San Luis Rey River, San Diego County	October
W. C. Davidson	5,000	Garcia River and Saunders Creek, Mendocino County.	October
Chas. Wright	40,000	Cold Creek, Siskiyou County	October
Otas E. Pile	7,500	Butte Creek and Oris Lake, Siskiyou County	October
C. M. Parker	9,000	Back Fence, Kangaroo, Bull and Secret lakes, Siskiyou County.	October
Fred. Sullaway	30,000	Wagon Creek, Siskiyou County	October
Fish and Game Commission.	35,000	Big Spring Creek at Rupps Lake, Siskiyou County.	October
Fish and Game Commission.	20,000	Headwaters Sacramento River, Siskiyou County.	October
Fish and Game Commission.	43,000	Sacramento River at Delta, Shasta County	October
	10,000	Held in hatchery ponds, Sisson.	
Total	1,293,500		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF EASTERN BROOK TROUT.

Applicant.	Number.	Waters stocked.	Month of delivery.
J. M. Little	6,000	Rich Gulch and Rush Creek, Plumas County	May
H. C. Chamberlain and associates.	18,000	Homer Lake, Long Valley reservoir and Wolf Creek, Plumas County.	May
W. C. Robinson	18,000	Bear, Buck, Mill, Big, Clear, Rock, Silver and Grizzly creeks, Plumas County.	May
G. C. Longhurst	6,000	Poplar and Miller creeks, Plumas County	May
M. A. Bernheim	12,000	Eureka, Grass, Jamison and Rock lakes and Jamison Creek, Plumas County.	May
Portola Improvement Association.	9,000	Willow, Humbug and Grizzly creeks, Plumas County.	May
Smith & Weil	6,000	Mill Creek and Three Lakes, Plumas County	May
Taylorsville Gun Club	12,000	Lights, Cooks, Indian and Grizzly creeks, Plumas County.	May
Quincy Gun Club	12,000	Spanish, Rock, Mill, Clear, Greenhorn and Taylor creeks and Middle Fork Feather River, Plumas County.	May
A. Machomich	6,000	Feather River, Sulphur and Willow creeks, Plumas County.	May
Chas. Geisendorfer	6,000	Catfish Creek, Placer County	June
W. J. McCleary	9,000	Combs Ravine and Bunch Canyon, Placer County.	June
Samuel Mitchell	6,000	Bear River and Canyon Creek, Placer County	June
Boca Mill Company	10,000	Little Truckee River, Nevada County	June
F. M. Rutherford	20,000	Truckee River, Schaffer and Alder creeks, Nevada County.	June
W. F. Whittier	12,000	Warmcastle Canyon, Squaw and Snell creeks, Siskiyou County.	June
North Fork Game Protective Association.	12,000	Gass Canyon Creek and Dry Creek, Placer County.	June
J. F. Geisendorfer	6,000	Headwaters of Wooley Creek, Placer County	June
J. B. Knapp	18,000	Canyon Creek and North Fork American River, Placer County.	June
H. M. Freeman	24,000	South Yuba River, Placer County	June
A. S. Nichols	12,000	Feather River, Sierra County	June
Lake Tahoe Railway and Transportation Co.	24,000	Blackwood Creek and Truckee River, Placer County.	June
Grover Russi	18,000	Prosser Creek, Nevada County	June
North Fork Game Protective Association.	18,000	North and Middle Forks American River, Owl and Grass Canyon creeks, Placer County.	June
Nevada City Hunting and Fishing Club.	30,000	Deer, Rock, Little Deer creeks and Woods Ravine, Nevada County.	June
C. F. Hensel	12,000	North Fork Elder Creek, Tehama County	June
E. Meybem	12,000	Butte Creek, Butte County	June
Ocean Shore Railroad Company.	6,000	Pedro, Tunitas, Frenchman, Higgins, Lobitos and Purissima creeks, San Mateo County.	June
Chas. H. Glenn	18,000	Mill Creek and South, Middle and North Forks Stony Creek, Colusa County.	June
Phil T. Laugenour	18,000	Cache and Allen creeks, Yolo County	June
H. H. Zimmerman	12,000	Mill Creek, Tehama County	June
Mrs. Geo. Farley, Jr.	18,000	Kelsey Creek, Lake County	June
B. G. Dichman	12,000	Clear Creek, Napa County	June
Sierra and San Francisco Power Company.	18,000	Indian and Clarks creeks and Middle Fork Stanislaus River, Tuolumne County.	July
Geo. F. Conlin	12,000	South Fork Stanislaus River, Tuolumne County.	July
G. W. Vestal	9,000	South Fork Cottonwood Creek, Tehama County.	July
W. M. McCleary	9,000	Shirttail Canyon, Placer County	July
W. J. Hall	6,000	Bear River, Placer County	July
H. Wilkie	12,000	Prosser Creek, Nevada County	July
Miss Katherine Chandler	12,000	Five Lakes, Bear and Squaw creeks, Placer County.	July

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF EASTERN BROOK TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
Glen Alpine Springs Company.	9,000	Susie Lake, El Dorado County	July
Al Tahoe Company	6,000	Trout and Cold creeks, El Dorado County	July
Mrs. G. W. Kenney	6,000	Independence Lake, Nevada County	July
Lawrence & Comstock	18,000	Small lakes and streams near Tallac, El Dorado County.	July
Tahoe Vista Investment Company.	9,000	Griff Creek, Placer County	July
H. E. Cagwin	9,000	Upper and Lower Echo lakes, El Dorado County.	July
Santa Clara County Fish and Game Protective Association.	36,000	Distributed in streams of Santa Clara County	July
Frank P. Cady	7,500	Susan River, Silver and Caribou lakes, Lassen County.	July
F. D. Hall	5,000	Willow Creek Lassen County	July
Wm. E. Vincent	2,500	Secret Creek, Lassen County	July
Chas. W. Williams	2,500	Parker Creek, Modoc County	July
Geo. D. Campbell	2,500	East Creek, Modoc County	July
L. H. Sisson	2,500	South Fork Mill Creek, Modoc County	July
E. E. Archer	5,000	Shealds Creek, Modoc County	July
I. Lauer	2,500	Pine Creek, Modoc County	July
Sisson Promotion Association.	15,000	Sullaway, Big Spring creeks and North Fork Sacramento River, Siskiyou County.	July
Geo. Neale	6,000	Battle Creek, Tehama County	July
W. P. Yaney	18,000	Longley, Horton and Birch creeks and Middle and South Forks Bishop creek, Inyo County.	July
A. L. Stewart	9,000	Wyman and Crooked creeks, Inyo County	July
Hall & McAfee	30,000	Baker, Big Pine, Little Pine, Birch, Tinnemaha creeks, Big Pine Lakes and Red Mountain Lakes, Inyo County.	July
Harry Shaw	12,000	Dexter Creek, Inyo County	July
R. G. Buchanan	3,000	Walker River, Mono County	August
J. S. Cain	6,000	Walker River, Mono County	August
North Fork Association	9,000	North Fork American River, Placer County	August
A. G. McFarland	6,000	South Fork Yuba River, Placer County	August
Webber Lake Club	6,000	Tributary of Webber Lake, Nevada County	August
J. E. Powell	6,000	Walker River and Lost Canyon, Mono County	August
C. W. Rickey	6,000	Walker River and Big Slough, Mono County	August
G. F. Zentgraff	6,000	Pilot and Bear creeks, El Dorado County	August
Jas. Bryson	7,500	Echo and Adrian lakes and American River, El Dorado County.	August
Grass Valley Sportsmen's Club.	20,000	Clipper, Wolf, Rattlesnake, Dry, Squirrel, Nigger and Slate creeks, Nevada County.	August
A. D. Ferguson	30,000	Six unnamed lakes in High Sierras of Fresno County.	August
Deer Creek Fish and Game Protective Association.	5,000	North and South Deer creeks, Tulare County	August
W. A. Sperry	5,000	Grizzly Creek and Clover Valley creek, Plumas County.	August
Yosemite Valley Railroad Company.	10,000	Merced River, Mariposa County	September
Major Wm. W. Forsyth	10,000	Merced River, Mariposa County	September
W. C. Davidson	5,000	Garcia River and Saunders Creek, Mendocino County.	October
Chas. Wright	10,000	Cold Creek, Siskiyou County	October
	17,500	Held in hatchery ponds, Sisson.	
Total	966,000		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT.

Applicant.	Number.	Waters stocked.	Month of delivery.
J. McClung	12,000	Berry Creek, Plumas County	May
E. E. Gerry	30,000	North Fork Feather River, Plumas County	May
R. Belden	6,000	Indian and Yellow creeks, Plumas County	May
J. M. Little	6,000	Rich Gulch and Rush Creek, Plumas County	May
J. C. Donnelly	3,000	Grizzly Creek, Plumas County	May
H. C. Chamberlain and associates.	24,000	Homer Lake, Long Valley reservoir and Wolf Creek, Plumas County.	May
W. C. Robinson and others.	51,000	Bear, Birch, Mill, Big, Clear, Rock, Silver and Grizzly creeks, Plumas County.	May
G. C. Longhurst	6,000	Poplar and Miller creeks, Plumas County	May
M. H. Bernheim	12,000	Eureka, Grass, Jamison and Rock lakes and Jamison Creek, Plumas County.	May
Portola Improvement Association.	12,000	Willow, Humbug and Grizzly creeks, Plumas County.	May
R. Van der Naillen	9,000	Yellow and Butte creeks, Plumas County	May
Smith & Weil	18,000	Mill Creek and Three Lakes, Plumas County	May
Taylorsville Gun Club	24,000	Lights, Cooks, Indian and Grizzly creeks, Plumas County.	May
G. H. Goodhue	30,000	Indian Creek, Plumas County	May
Quincy Gun Club	54,000	Spanish, Rush, Mill, Clear, Greenhorn and Taylor creeks, and Middle Fork Feather River, Plumas County.	May
T. A. Church	12,000	Long Valley Creek, Plumas County	May
C. N. Johnson	12,000	Feather River and Smith Creek, Plumas County.	May
A. Machomich	18,000	Feather River, Sulphur and Willow creeks, Plumas County.	May
Wm. Galleppi estate	12,000	Last Chance Valley creeks, Plumas County	May
Chas. Geisendorfer	6,000	Catfish Creek, Placer County	June
W. J. McCleary	6,000	Bunch Canyon and Combs Ravine, Placer County.	June
Samuel Mitchell	9,000	Bear River and Canyon Creek, Placer County	June
Boca Mill Company	68,500	Little Truckee River, Nevada County	June
F. M. Rutherford	10,000	Truckee River, Schaffer and Alder creeks, Nevada County.	June
Sierra Nevada Wood and Lumber Company.	40,000	Prosser Creek, Nevada County	June
S. McKay	25,000	Donner Creek, Nevada County	June
G. F. Kelly	35,000	Truckee River and tributaries, Nevada County	June
W. F. Whittier	24,000	Warmcastle Canyon, Squaw Creek and Snell Creek, Siskiyou County.	June
McCloud River Railroad	60,000	McCloud River, Siskiyou County	June
W. I. Bray	30,000	Antelope Creek, Siskiyou County	June
Siskiyou County Electric Light and Power Company.	30,000	Fall Creek, Siskiyou County	June
Z. Abrams	18,000	Abrams Lake, Siskiyou County	June
Geo. Dennis	60,000	Big Springs, Siskiyou County	June
H. R. Hanley	18,000	Squaw Creek, Shasta County	June
North Fork Game Protective Association.	12,000	Grass Canyon and Dry creeks, Placer County	June
Clark & Branson	30,000	French, Payne's, Etna and Patterson creeks Siskiyou County.	June
J. F. Geisendorfer	6,000	Headwaters Wooley Creek, Placer County	June
Dr. W. M. Tryon	6,000	Green Valley Creek, Placer County	June
J. B. Knapp	6,000	Canyon Creek and North Fork American River, Placer County.	June
H. M. Freeman	42,000	South Yuba River, Placer County	June
A. S. Nichols	24,000	Feather River, Sierra County	June
Lake Tahoe Railway and Transportation Co.	48,000	Blackwood Creek and Truckee River, Placer County.	June
Harmon Bell	36,000	Sweetbriar Creek, Shasta County	June
Jerry Buckley	30,000	Battle Creek, Shasta County	June
Lee Richardson	18,000	Mud Creek, Butte County	June
Nevada City Hunting and Fishing Club.	60,000	Deer, Rock, Little Deer and Woods ravine creeks, Nevada County.	June

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
F. G. Brown	24,000	Oregon Creek, Sierra County	June
Meek Mercantile Company.	36,000	Oregon Creek, Yuba County	June
L. Y. Coggins	21,000	Dobkins Lake and North Fork Eddy Creek, Siskiyou County.	June
E. C. Lloyd	36,000	Parks Creek, Siskiyou County	June
H. H. Hudson	30,000	Little Shasta River, Siskiyou County	June
California Fish and Game Commission.	300,000	Klamath River, Siskiyou County	June
Kennett Athletic Club	15,000	Big Backbone Creek, Shasta County	June
C. L. Watson	30,000	Clear Creek, Shasta County	June
J. H. Bradley	18,000	Antelope Creek, Tehama County	June
E. Meybem	24,000	Butte Creek, Butte County	June
A. C. Musselman	18,000	Little Butte and Mosquito creeks, Butte County.	June
W. J. Whittier	60,000	West branch of North Fork Feather River, Butte County.	June
B. F. Kaufman	36,000	Little West branch North Fork of Feather River, Butte County.	June
P. H. Dunbar	30,000	Big Nimshew and west branch Feather River Butte County.	June
Clay Buchanan	36,000	Little Nimshew, Big Nimshew and Last Chance creeks, Butte County.	June
Elizabeth G. Stevenson	12,000	Butte Creek, Butte County	June
Santa Clara Co. Fish and Game Protective Association.	30,000	Sweljert, Almaden, Guadalupe, Penetentia and Saratoga creeks, Santa Clara County.	June
J. H. Livermore	9,000	Bear Gulch Creek, San Mateo County	June
Ocean Shore Railroad Company.	45,000	Pedro, Tunitas, Frenchman and Higgins, Lobitas, and Purissima creeks, San Mateo County.	June
J. Boshoff	60,000	Pescadero, Butano and Gazos creeks, San Mateo County.	June
J. A. Owen	24,000	South Fork Cottonwood Creek, Tehama County.	June
Chas. H. Glenn	30,000	Mill Creek and South, Middle and North Forks of Stony Creek, Colusa County.	June
Phil. T. Laugenour	42,000	Cache and Allen creeks, Yolo County	June
Bartlett Springs Company.	30,000	Cache, Bartlett, Mill and Twin Valley creeks, Lake County.	June
Alameda County Fish and Game Protective Association.	12,000	Trout Creek, Alameda County	June
Earle Downing	12,000	Stony Brook and Alameda Creek, Alameda County.	June
Earle Downing	12,000	Tributaries of Valpe and Arroyo Valle, Alameda County.	June
Earle Downing	36,000	La Costa, Indian, Alameda, Bear and Apperson creeks, Alameda County.	June
Earle Downing	24,000	San Lorenzo, Bolinas and Palomar creeks, Alameda County.	June
H. H. Zimmerman	12,000	Mill Creek, Tehama County	July
Fred Werner	18,000	Sutter Creek, Amador County	July
Geo. F. Zentgraff	12,000	South Fork American River, El Dorado County.	July
M. A. Miller	12,000	South Fork American River, El Dorado County.	July
W. R. Stearns	15,000	Sonoma Creek, Sonoma County	July
City of Vallejo	30,000	Lake No. 2 and in creek between Dam No. 1 and Dam No. 2, Solano County.	July
Mrs. Geo. Farley, Jr.	6,000	Kelsey Creek, Lake County	July
John P. Orr	9,000	Soscol Creek, Napa County	July
Joshua Spires	24,000	Marlo, Spiguet and Big Canyon creeks, Lake County.	July
Wm. West and D. S. Keyser.	72,000	Milliken Creek, Napa County	July

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
B. G. Dichman	9,000	Clear Creek, Napa County	July
Sierra and San Francisco Power Company.	42,000	Indian and Clarks creeks and Middle Fork Stanislaus River, Tuolumne County.	July
Geo. F. Conlin	36,000	South Fork Stanislaus River, Tuolumne County.	July
R. B. Shaw and H. M. De Ferrari.	24,000	South and Middle Forks Tuolumne River, Tuolumne County.	July
J. O. Bigelow	24,000	Basin Creek, Tuolumne County	July
D. E. Roberts	36,000	North Fork Stanislaus River, Beaver, San Antone and O'Neal creeks, Calaveras County.	July
F. L. Dimock	36,000	Sacramento River, Shasta County	July
G. W. Vestal	9,000	South Fork Cottonwood Creek, Tehama County.	July
S. V. Baron	24,000	Mill Creek, Tehama County	July
E. W. Elfendahl	30,000	Slate Creek, Shasta County	July
Dr. Wm. Tryon	6,000	Green Valley Creek, Placer County	July
W. J. Hall	12,000	Bear River, Placer County	July
W. C. Murdoch	21,000	Tributary of Webber Lake, Sierra County	July
Miss Katherine Chandler	12,000	Five Lakes, Bear and Squaw creeks, Placer County.	July
Glen Alpine Springs Company.	15,000	Susie Lake, El Dorado County	July
Al Tahoe Company	12,000	Trout and Cole creeks, El Dorado County	July
Mrs. G. W. Kenney	18,000	Independence Lake, Nevada County	July
Lawrence & Comstock	6,000	Small lakes and streams near Tallac, El Dorado County.	July
Tahoe Vista Investment Company.	9,000	Griff Creek, Placer County	July
H. E. Cagwin	12,000	Upper and Lower Echo lakes, El Dorado County.	July
Santa Clara County Fish and Game Protective Association.	114,000	Planted in the streams of Santa Clara County	July
John L. D. Roberts	72,000	The mountain and coast streams of Monterey County.	July
Dan McCloskey	18,000	Dos Picachos, Bird and Los Muertos creeks, San Benito County.	July
H. G. Porter	27,000	North Fork Feather River, Plumas County	July
H. L. Beecroft	6,000	Grizzly Creek, Ice Lake, Plumas County	July
Frank P. Cady	15,000	Susan River and Silver and Caribou lakes, Lassen County.	July
F. D. Hall	5,000	Willow Creek, Lassen County	July
Wm. E. Vincent	7,500	Secret Creek, Lassen County	July
Dr. C. M. Tinsman	15,000	Ash Creek, Modoc County	July
Chas. W. Williams	7,500	Parker Creek, Modoc County	July
Geo. D. Campbell	5,000	East Creek, Modoc County	July
L. H. Sisson	5,000	South Fork Mill Creek, Modoc County	July
Wm. W. Ahl	10,000	Fitzhugh Creek, Modoc County	July
E. E. Auble	10,000	Fitzhugh Creek, Modoc County	July
I. Lauer	7,500	Pine Creek, Modoc County	July
C. W. Williams	25,000	South Fork Pitt River, Modoc County	July
W. L. Leland	7,500	Antelope, Bottle and Willow creeks, Modoc County.	July
S. F. Ballard	10,000	Thomas Creek, Modoc County	July
Ira Hansen	7,500	Parker Creek, Modoc County	July
H. O. Wickes	36,000	Sacramento River, Shasta County	July
A. F. Stoner	24,000	Tejon Creek, Kern County	July
W. A. Wirth	45,000	North Fork Kern River, Kern County	July
Hall & McAfee	21,000	Baker, Big Pine, Little Pine, Birch and Tinnemaha creeks, Big Pine Lake and Red Mountain lakes, Inyo County.	July
Sisson Promotion Association.	75,000	Sullaway and Big Spring creeks, and North Fork Sacramento River, Siskiyou County.	July
Geo. Neale	12,000	Battle Creek, Tehama County	July
W. B. Engle	89,000	Shepherds Creek, Inyo County	July

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
Mrs. M. A. Bruley	18,000	Sacramento River, Shasta County	August
A. Davies	9,000	Little Truckee River, Nevada County	August
R. G. Buchanan	6,000	Walker River, Mono County	August
J. S. Cain	12,000	Walker River, Mono County	August
North Fork Association	24,000	North Fork American River, Placer County	August
A. G. McFarland	12,000	South Fork Yuba River, Placer County	August
Webber Lake Club	12,000	Tributary Webber Lake, Nevada County	August
J. E. Powell	6,000	Walker River and Lost Canyon, Mono County	August
C. W. Rickey	6,000	Walker River and Big Slough, Mono County	August
Euell Gray	72,000	Silver, Sly, Park and Alder creeks, Ogilvie Canyon and American River, El Dorado County.	August
J. M. Amick	18,000	Mokelumne and Bear rivers and South Fork Cosumnes, Amador County.	August
C. S. Wilson	18,000	Indian, Reddings, Browns, East Weaver and Rush creeks, Trinity County.	August
J. W. Metcalf	60,000	Sacramento River, Shasta County	August
F. O. Branstetter	36,000	Sacramento River, Siskiyou County	August
D. E. Roberts	30,000	Middle Fork Calaveras River, Calaveras County.	August
I. O. Jillson	24,000	Crystal, Willow and Clear creeks and Klines Gulch, Shasta County.	August
California Door Company.	15,000	North and Middle Forks Cosumnes River, Steeley Fork, Middle, McKinney's, Dog Town and Cut creeks, El Dorado County.	August
James Dodds	18,000	El Dorado, Black, Secret and Humbug canyons, Placer County.	August
Geo. E. King	15,000	Woodruth and Rock creeks and North, East and South Forks of North Yuba River, Sierra County.	August
R. Colwell	12,000	Rubicon River and Rock Bound Lake, El Dorado County.	August
Glen Alpine Springs Company.	15,000	Glen Alpine Creek and Grass, Susie and Heather lakes, El Dorado County.	August
Mayo A. Greenlaw	9,000	Echo Lake, El Dorado County	August
W. W. Price	12,000	Witches Cave and Floating Island, Cathedral, Upper and Lower Angora lakes and Glen Alpine Creek, El Dorado County.	August
Grass Valley Sportsmen's Club.	60,000	Clipper, Wolf, Rattlesnake, Dry, Squirrel, Nigger and Slate creeks, Nevada County.	August
Lawrence & Comstock	9,000	Floating Island and Angora lakes, El Dorado County.	August
Bert Berry	9,000	Poro Creek, Tulare County	September
Widgeon Gun Club	42,000	Kaweah River, Tulare County	September
John Fitzpatrick	18,000	San Benito Creek, Fresno County	September
Porterville Fish and Game Protective Association.	72,000	Redwood, Kessing, Belnap, Boulder and McIntyre creeks, Tulare County.	September
Deer Creek Fish and Game Protective Association.	24,000	North and South Deer creeks, Tulare County	September
T. A. Chatten	27,000	Eagle Creek, East Fork Kaweah and Franklin lakes, Tulare County.	September
H. G. McCaughey	24,000	Salmon Creek, Sonoma County	September
C. G. Boisdorff	27,000	Russian River, Sonoma County	September
W. A. Sperry	18,000	Grizzly Creek and Clover Valley, Plumas County.	September
Con Roman	6,000	Cheda Creek, Marin County	September
W. A. Jinkerson	30,000	North, Middle and South Forks Cosumnes River, El Dorado County.	September
E. A. Pearce	9,000	San Juan Canyon Creek, San Benito County	September
Monterey Fish and Game Protective Association.	30,000	Rocky, Mill, Miller, Garapatas and Cocagahua creeks, Monterey County.	September
S. E. Whitcher	24,000	Arroyo Seco, Monterey County	September
J. H. Hollister	60,000	Upper San Luis, Torro, Marro, San Luisito, Charro, Corral de Piedra, See Canyon, Coon and Welsh creeks, San Luis Obispo County.	September

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT—*Continued.*

Applicant.	Number.	Waters stocked.	Month of delivery.
Dr. C. S. Noble and others.	24,000	Lopez, Arroyo Grande and Tar Spring creeks, San Luis Obispo County.	September
H. J. Abels	15,000	Sisquoc and Manzana rivers and Birabut creek, Santa Barbara County.	September
H. J. Doulton	30,000	Santa Ynez River and tributaries, Santa Barbara County.	September
H. S. Deaderick	9,000	Rincon, Gills and Bloodo creeks, Santa Barbara County.	September
Jas. Rasmussen and Sim Myers.	96,000	Coyote Creek, Ventura River and North Fork San Antonio Creek, Ventura County.	September
C. E. Carr	24,000	Trinity River, Trinity County	October
Yosemite Valley Railroad	78,000	Merced River, Merced County	October
Major Wm. W. Forsyth	24,000	Merced River, Mariposa County	October
W. M. Avis	21,000	San Dimas, Wolfskill and Palmer canyons and Recreation Run, Los Angeles County.	October
W. J. Sanborn	18,000	Bear and Ice House canyons and San Antonio River, Los Angeles County.	October
E. D. Silent	24,000	Malibu Creek, Los Angeles County	October
Geo. E. Little	12,000	Rio Hondo and San Jose creeks, Los Angeles County.	October
W. G. Kerckhoff	45,000	San Antonio Creek, Los Angeles County	October
Jas. A. Vale	120,000	Lytle, Devoir, Cable, City, Plunge, Bear, Mill, Salfrit, Creeley, Huston, Grass Valley, Little Bear, Hook, Deep, and Holcomb creeks and Devil and Waterman canyons, San Bernardino County.	October
Strong & Dickenson	12,000	Strawberry Creek, Riverside County	October
John Shaver	15,000	South and North Forks San Jacinto River, Riverside County.	October
H. W. O'Melveney	105,000	San Gabriel River, Los Angeles County	October
Will E. Chapin	12,000	Big Tejunga Creek, Los Angeles County	October
Albert Cummings	12,000	Cummings Creek, Kern County	October
Webb Toms	21,000	Santa Ysabel, Cedar, Cottonwood and Boulder creeks, San Diego County.	October
Jas. A. Vale	6,000	Whitewater Creek, San Bernardino County	October
F. A. Forster	15,000	San Juan, Mission, Viejo and San Juan Hot Springs creeks, Orange County.	October
B. L. Crise	18,000	Pauma Creek, San Diego County	October
H. I. Pritchard	12,000	Topango Creek, Los Angeles County	October
W. K. Robinson	24,000	Tobacco, Santiago and Silverado creeks, Orange County.	October
A. Stacy	9,000	Cold Water Canyon, Riverside County	October
E. B. Collier	9,000	Malibu Canyon, Riverside County	October
Ed. Fletcher	9,000	San Luis Rey River, San Diego County	October
W. C. Davidson	18,000	Garcia River and Saunders Creek, Mendocino County.	October
Chas. Wright	50,000	Cold Creek, Siskiyou County	October
Otas E. Pile	18,000	Butte Creek and Oris Lake, Siskiyou County	October
A. D. Shepard	30,000	Soda Creek, Shasta County	October
Forest Service	24,000	Pilgrim Creek, Siskiyou County	October
J. N. Dobkins	12,000	Shasta River, Siskiyou County	October
Fish and Game Commission.	30,000	Big Spring Creek, at Rupps Lake, Siskiyou County.	October
Fish and Game Commission.	75,000	Sacramento River, Siskiyou County	October
W. W. Morgan	24,000	Antelope Creek, Tehama County	October
Fish and Game Commission.	214,670	Klamath River, Siskiyou County	October
Fish and Game Commission.	78,000	Sacramento River, Shasta County	October
L. W. Fouquier	30,000	Shasta River, Siskiyou County	October
	50,000	In Klinks Lake, for Sisson Hatchery.	
	25,000	In ponds at Sisson Hatchery.	
	75,000	In Sisson Lake, for Sisson Hatchery.	
Total	5,950,670		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF STEELHEAD TROUT (*Salmo gairdneri*).

Applicant.	Number.	Waters stocked.	Month of delivery.
North Fork Game Protective Association.	60,000	North and Middle Forks American River, Owl Creek and Gas Canyon Creek, Placer County.	June
Ocean Shore Railroad Company.	102,000	Pedro, Tunitas, Frenchman and Higgins, Lobitas and Purissima creeks, San Mateo County.	June
Joseph B. Fleming	18,000	San Pedro Creek, San Mateo County	June
J. Boshoff	30,000	Pescadero, Butano and Gazos creeks, San Mateo County.	June
Earle Downing	18,000	Mocho Creek, Alameda County	June
Geo. F. Zentgraff	12,000	South Fork American River, El Dorado County.	July
Earle Downing	18,000	San Leandro and Ivy creeks, Alameda County	June
M. A. Miller	12,000	South Fork American River, El Dorado County.	June
W. R. Stearns	9,000	Sonoma Creek, Sonoma County	June
John P. Orr	9,000	Soscol Creek, Napa County	June
B. G. Dichman	9,000	Clear Creek, Napa County	June
Santa Clara County Fish and Game Protective Association.	12,000	Distributed in streams of Santa Clara County	June
Dan McCloskey	18,000	Dos Picachos, Bird Creek and Los Muertos, San Benito County.	June
C. G. Bolsdorff	9,000	Russian River, Sonoma County	September
Fish and Game Commission.	25,000	Big Spring Creek at Rupps Lake, Siskiyou County.	October
Total	361,000		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF LARGE LAKE TROUT (*Salmo m. tahoensis*).

Applicant.	Number.	Waters stocked.	Month of delivery.
Nevada, California and Oregon Railway.	15,000	Goose Lake, Modoc County	July
A. D. Shepard	15,000	Castle Lake, Siskiyou County	September
G. A. Caswell	24,000	Medicine Lake, Siskiyou County	September
Z. Abrams	30,000	Abrams Lake, Siskiyou County	October
Total	84,000		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF BLACK-SPOTTED TROUT (*Salmo m. henshawii*).

Applicant.	Number.	Waters stocked.	Month of delivery.
H. L. Beecroft	6,000	Grizzly Creek and Ice Lake, Plumas County	July
J. N. Durney	15,000	Mt. Eddy Lake, Siskiyou County	July
Percy Lovejoy	15,000	Mt. Eddy Lake, Siskiyou County	July
Euell Gray	120,000	Cody, Right, Dark, Blood, Echo, Succor and Andrian lakes and American River, El Dorado County.	September
A. D. Shepard	60,000	Castle Lake, Siskiyou County	September
Z. Abrams	20,000	Abrams Lake, Siskiyou County	September
Otas E. Pile	7,500	Butte Creek and Oris Lake, Siskiyou County	October
O. M. Parker	9,000	Back Fence, Kangaroo, Bull and Secret lakes, Siskiyou County.	October
Fred Sullaway	30,000	Wagon Creek, Siskiyou County	October
Fish and Game Commission.	20,000	Big Spring Creek at Rupps Lake, Siskiyou County.	October
B. L. Crise	6,000	Pauma Creek, San Diego County	October
	10,000	Held in hatchery ponds, Sisson.	
Total	318,500		

SISSON HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF QUINNAT SALMON.

Date.		Waters stocked.	Number.
February	23	Cold Creek, Siskiyou County	357,700
April	2	Klamath River at Hornbrook, Siskiyou County	350,000
April	4	Sacramento River at Dunsmuir, Siskiyou County	350,000
April	4	Sent to Sacramento to be marked, Sacramento County	50,000
April	18-30	Cold and Sullaway creeks, Siskiyou County	912,665
April	6	Flume Creek, tributary to Sacramento River, Shasta County	350,000
April	8	Sacramento River at Lamoine, Shasta County	350,000
April	9	Sacramento River at Delta, Shasta County	350,000
April	9	Cold and Sullaway creeks, Siskiyou County	603,735
April	11	Sacramento River at Delta, Shasta County	350,000
April	15	Cold Creek, tributary to Sacramento River, Siskiyou County	334,855
April	23	Sacramento River at Delta, Shasta County	350,000
May	1	Cold Creek, tributary to Sacramento River, Siskiyou County	87,900
May	1	Cold Creek, tributary to Sacramento River, Siskiyou County	294,075
May	16	Sisson Lake, Siskiyou County	287,650
May	17	Sisson Lake, Siskiyou County	763,975
		Total	6,142,555

TAHOE HATCHERIES.

Fish Distribution, Season 1912.

DISTRIBUTION OF BLACK-SPOTTED TROUT (*Salmo m. henshawii*).

Date.		Waters stocked.	Number.
July	30	Truckee River, Placer County	66,300
August	4	Ward Creek, Placer County	80,000
August	7	Slim Jim Creek, Placer County	70,000
August	17	Griffin Creek, Placer County	50,000
August	28	Truckee River, Placer County	30,000
August	29	Independence Lake, Sierra County	40,000
September	5	Ward Creek, Placer County	42,000
September	12	Richardson Lake, El Dorado County	35,000
September	13	Summit Lake, Nevada County	20,000
September	13	Lake Stirling, Nevada County	40,000
September	13	Truckee River, Placer County	40,000
September	14	Donner Lake, Nevada County	45,000
September	15	Donner Lake, Nevada County	45,000
September	15	Burton Creek, El Dorado County	10,000
September	18	Rubicon River, El Dorado County	40,000
September	18	Richardson Lake, El Dorado County	30,000
September	18	Webber Lake, Sierra County	60,000
September	19	Webber Lake, Sierra County	30,000
September	19	Donner Lake, Nevada County	15,000
September	22	Blackwood Creek, Placer County	35,000
September	23	Blackwood Creek, Placer County	50,000
September	26	Blackwood Creek, Placer County	60,000
September	27	Ward Creek, Placer County	30,000
October	1	Rock Bound Lakes, El Dorado County	28,500
October	7	Experimental work in Nevada County	1,337
		Total	993,137

TALLAC HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF BLACK-SPOTTED TROUT (*Salmo m. henshawii*).

Date.		Waters stocked.	Number.
June	22	Taylor Creek, El Dorado County	95,000
June	23	Taylor Creek, El Dorado County	40,000
June	25	Tallac Creek, El Dorado County	62,000
June	25	Fallen Leaf Lake, El Dorado County	62,000
June	29	Tallac Creek, El Dorado County	62,000
June	29	Fallen Leaf Lake, El Dorado County	62,000
July	2	Tallac Creek, El Dorado County	126,000
July	3	Powerhouse ditch, El Dorado County	71,000
July	5	Fallen Leaf Lake, El Dorado County	79,000
July	6	Cascade Lake, El Dorado County	62,000
July	9	Powerhouse ditch, El Dorado County	24,000
July	9	Cascade Lake, El Dorado County	62,000
July	11	Tallac Creek, El Dorado County	62,000
July	11	Fallen Leaf Lake, El Dorado County	62,000
July	12	Little Truckee River, El Dorado County	40,000
July	13	Cascade Lake, El Dorado County	62,000
July	13	Taylor Creek, El Dorado County	69,840
July	16	Taylor Creek, El Dorado County	68,000
July	16	Powerhouse ditch, El Dorado County	68,000
July	21	Taylor Creek, El Dorado County	68,011
		Total	1,306,851

TALLAC HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF LARGE LAKE TROUT (*Salmo m. tahoensis*).

Date.		Waters stocked.	Number.
June	29	Fallen Leaf Lake, El Dorado County	14,000
July	11	Fallen Leaf Lake, El Dorado County	28,000
July	12	Little Truckee River, El Dorado County	14,000
July	13	Cascade Lake, El Dorado County	14,000
July	16	Taylor Creek, El Dorado County	20,000
July	22	Meyers Creek, El Dorado County	35,000
July	23	Taylor Creek, El Dorado County	28,000
July	24	Grass Lake, El Dorado County	35,000
July	25	Cascade Lake, El Dorado County	35,000
July	25	Little Truckee and Angora creeks, El Dorado County	35,000
July	26	Cascade Lake, El Dorado County	52,221
		Total	310,221

GLEN ALPINE HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF BLACK-SPOTTED TROUT (*Salmo m. henshawii*).

Date.		Waters stocked.	Number.
July	20	Lily Lake, El Dorado County	60,000
July	21	Grass Lake, El Dorado County	90,000
July	22	Susie Lake, El Dorado County	15,000
July	22	Heather Lake, El Dorado County	45,000
July	22	Gilmore Lake, El Dorado County	45,000
July	23	Lucile Lake, El Dorado County	15,000
July	24	Half Moon Lake, El Dorado County	60,000
July	25	Grass Lake, El Dorado County	30,000
July	25	Susie Lake, El Dorado County	60,000
July	25	Glen Alpine Lake, El Dorado County	25,649
July	23	Lake of the Woods, El Dorado County	30,000
		Total	475,649

TAHOE HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF EASTERN BROOK TROUT (*Salvelinus fontinalis*).

Date.	Applicant.	Number.	Waters stocked.
Sept. 5	R. Colwell	4,500	Rubicon River, El Dorado County.
Sept. 12	Lawrence & Comstock	5,000	Velma and Granite lakes, El Dorado County.
Sept. 13	F. Gowling	1,500	Summit Lake, Nevada County.
Sept. 15	A. Buckman	900	Cold Stream, Nevada County.
Sept. 16	Lake Tahoe Railway and Transportation Company.	2,800	Watson Lake, Placer County.
Sept. 17	Lake Tahoe Railway and Transportation Company.	2,800	Watson Lake, Placer County.
Sept. 18	F. Pomin	1,500	Richardson Lake, El Dorado County.
Sept. 18	R. Colwell	2,800	Rubicon River, El Dorado County.
Sept. 20	Lake Tahoe Railway and Transportation Company.	1,000	Watson Lake, Placer County.
Sept. 22	Lake Tahoe Railway	1,500	Baker Creek, Placer County.
Sept. 30	R. Kopke	1,000	Truckee River, Nevada County.
	Total	25,300	

UKIAH HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF STEELHEAD TROUT.

Date.	Applicant.	Number.	Waters stocked.
June 4	C. N. Cox	10,000	Ore Creek, Mendocino County.
June 4	G. A. Johnson	10,000	Cold Creek, Mendocino County.
June 5	S. J. Holliday	12,000	Ackerman Creek, Mendocino County.
June 6	W. C. White	14,000	Reeves Creek, Mendocino County.
June 7	A. L. Gibson	16,000	Robinson Creek, Mendocino County.
June 7	John L. Orr	10,500	Big River, Mendocino County.
June 8	H. M. Whilley	15,000	Indian Creek, Mendocino County.
June 8	Elliott B. Davis	15,000	Indian Creek, Mendocino County.
June 8	Dr. C. O. Edwards	15,000	Navarro River, Mendocino County.
June 12	C. M. Manon	10,000	Jack Smith Creek, Mendocino County.
June 13	California Western Railway and Navigation Company.	50,000	Noyo River, Mendocino County.
June 19	H. M. Kemp	25,000	Blue Lakes, Lake County.
July 10	California Anglers Association	50,000	Sonoma Creek, Sonoma County.
July 13	California Anglers Association	50,000	Sulphur Creek, Sonoma County.
July 17	California Anglers Association	28,000	Austin Creek, Sonoma County.
July 20	California Anglers Association	75,000	Paper Mill and Lagunitas creeks, Marin County.
July 26	California Anglers Association	27,958	Russian River, Mendocino County.
	Total	433,458	

Total steelhead eggs shipped to Ukiah Hatchery	470,000
Total loss of eggs and fry	36,542
Number planted	433,458

WAWONA HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF RAINBOW TROUT.

Date.	Applicant.	Number.	Waters stocked.
June 25	Dr. A. H. Byers	8,757	Lewis and Hogue creeks, Madera County.
June 27	Dr. A. H. Byers	23,352	Thompson and Big creeks, Mariposa County.
June 28	B. H. Mace	5,838	Devils Canyon, Mariposa County.
June 29	E. T. Huffman	5,838	Miami Creek, Madera County.
June 29	A. C. Shaw	5,838	Woodward Creek, Madera County.
July 5	B. H. Mace	2,919	Conway Creek, Mariposa County.
July 13	E. T. Huffman	11,676	Miami Creek, Madera County.
July 15	B. Galispe	23,352	Meadow Creek and Stella Lake, Mariposa County.
July 16	F. C. Boyce	8,757	Merced River, Mariposa County.
July 23	J. C. Westfall	2,919	Oliver Creek, Mariposa County.
July 24	J. C. Westfall	5,838	Grizzly and Grouse creeks, Mariposa County.
July 30	United States Government agents	17,514	Ostrander Lake, Mariposa County.
July 30	J. C. Westfall	5,838	Owl Creek and South Fork Chowchilla River, Mariposa County.
July 31	J. C. Westfall	5,838	South Fork Chowchilla River, Mariposa County.
Aug. 1	J. S. Washburn	46,704	South Fork Merced River, Mariposa County.
Aug. 2	E. T. Huffman	5,838	Miami Creek, Madera County.
Aug. 2	A. C. Shaw	5,838	Grove Creek, Madera County.
Aug. 2	F. C. Boyce	23,352	Big Creek, Mariposa County.
	Total	216,006	

WAWONA HATCHERY.

Fish Distribution, Season 1912.

DISTRIBUTION OF BLACK-SPOTTED TROUT (*Salmo m. henshawii*).

Date.	Applicant.	Number.	Waters stocked.
July 5	B. H. Mace	5,203	Conway Creek, Mariposa County.
July 23	J. C. Westfall	5,203	Oliver Creek, Mariposa County.
July 24	J. C. Westfall	10,406	Grizzly and Grouse creeks, Mariposa County.
July 25	United States Government agents	52,030	Grouse and Crescent creeks, Madera County.
July 26	United States Government agents	41,624	Bridal Veil Creek, Mariposa County.
	Total	114,466	

DISTRIBUTION OF LARGE-MOUTH BLACK BASS.

(By Fish Car.)

Applicant.	Number.	Waters stocked.	Month of delivery.
M. H. Stitt	230	Cache Creek, Yolo County	Aug. 28
Chas. Domenghini	120	Emery Reservoir, Calaveras County	Aug. 30
Chester A. Scroggs	100	Laird Mine Hole, Placer County	Sept. 1
A. D. Shaw	75	Lane Lake, San Benito County	Sept. 2
W. P. Kelley	100	Lake Lagloria, Monterey County	Sept. 2
A. H. Fowler	125	Black Lake, San Luis Obispo County	Sept. 3
W. H. Graves	90	Hughes Lake, Los Angeles County	Sept. 4
Niles R. Turner	110	Turners Lake, San Bernardino County	Sept. 4
Los Angeles Park Commission.	800	Hollenbeck Park Lake, Los Angeles County	Sept. 5
Total	1,750		

Following is a summary of the distribution from the different hatcheries for the season of 1912:

Sisson Hatchery.

Trout eggs collected from the ponds and substations and received from other hatcheries:

	Eggs.	Loss.	Shipped to other stations.	Fry shipped and held for breeding.	Total shipped and held for breeding.
Loch Leven trout	1,500,000	206,500		1,293,500	
Eastern brook trout	1,000,000	94,000		906,000	
Rainbow trout	6,994,000	818,330	225,000	5,950,670	
Steelhead trout	416,600	55,600		361,000	
Large lake trout	92,922	8,922		84,000	
Black-spotted trout	370,164	51,664		318,500	8,913,670
Salmon	6,340,000	197,445		6,142,555	6,142,555
					15,056,225
Tahoe Hatcheries.					
Black-spotted trout	3,610,622	342,821	492,164	2,775,637	
Large lake trout	542,761	139,618	92,922	310,221	
Eastern brook trout				25,300	3,111,158
Brookdale Hatchery.					
Steelhead trout	2,709,300	603,200	1,302,600	803,500	803,500
Price Creek Hatchery.					
Steelhead trout	618,000	38,000		580,000	
Salmon	3,240,000	36,340		3,203,660	3,783,660
Ukiah Hatchery.					
Steelhead trout	470,000	36,542		433,458	433,458
Wawona Hatchery.					
Rainbow trout	225,000	8,994		216,006	
Black-spotted trout	122,000	7,534		114,466	330,472
Sacramento Experimental Station.					
Salmon	1,768,000	418,000	450,000	900,000	900,000
Mill Creek Station.					
Salmon	9,364,550	94,320	607,000	8,663,230	8,663,230
Black Bass.					
Adult black bass caught up and distributed for breeders					1,750

Total.

Trout distributed and held for breeding in State of California during season of 1912	14,172,258
Salmon distributed in State of California during season of 1912	18,909,445
Black bass distributed in State of California during season of 1912	1,750
Total	33,083,453

Fifty thousand grayling eggs received from U. S. Bureau of Fisheries, at Bozeman, Montana.

Ten thousand grayling fry were shipped to Monterey County, but were lost by applicant.

After the eggs were hatched the fry were placed in one of the ponds at Sisson. They have not been counted and the number remaining in the ponds is not known.

STATE OF CALIFORNIA

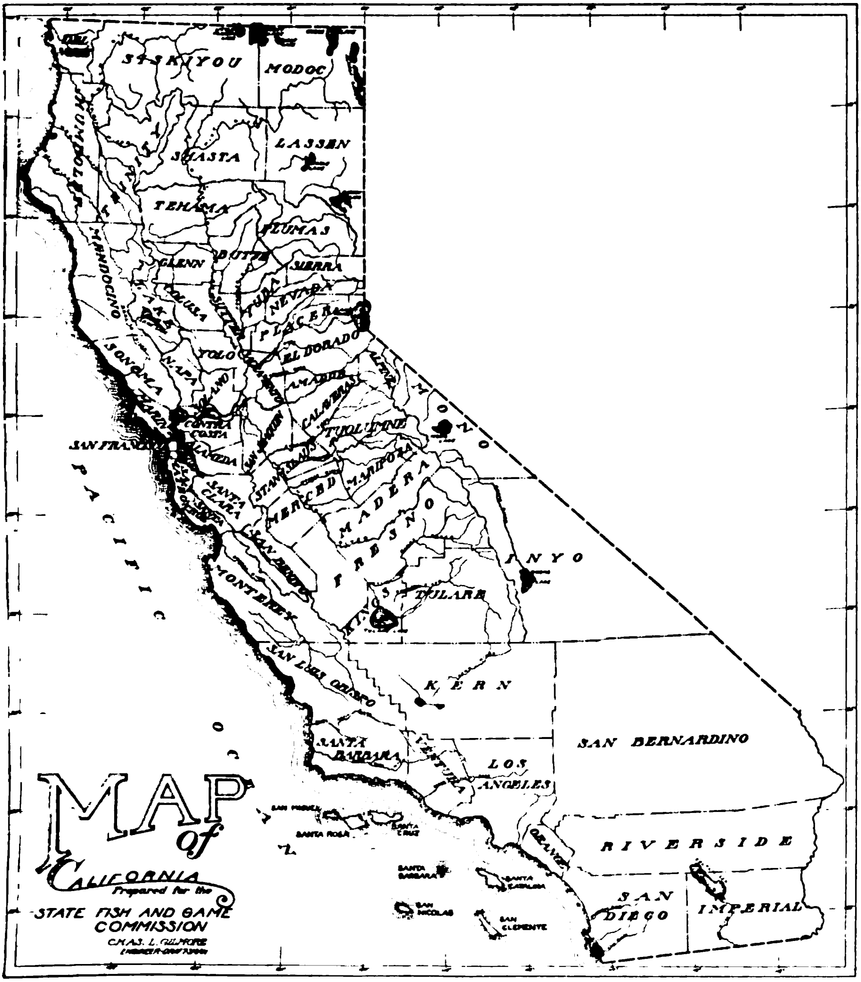
FISH AND GAME COMMISSION

TWENTY-THIRD BIENNIAL REPORT

For the Years 1912-1914

CALIFORNIA
STATE PRINTING OFFICE
1914

1—14148


MAP of CALIFORNIA
Prepared for the
STATE FISH AND GAME COMMISSION
CHAS. L. GILMORE
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
LAKE
COLUSA
SUTTER
YUBA
NEVADA
PLACER
YOLO
EL DORADO
SONOMA
NAPA
SOLANO
SACRAMENTO
AMADOR
ALPINE
MONO
MARIN
CONTRA COSTA
SAN JOAQUIN
CALAVERAS
TUOLUMNE
SAN FRANCISCO
ALAMEDA
SAN MATEO
STANISLAUS
MARIPOSA
SANTA CLARA
SANTA CRUZ
MERCED
MADERA
PACIFIC
SAN BENITO
FRESNO
INYO
MONTEREY
KINGS
TULARE
OCEAN
SAN LUIS OBISPO
KERN
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
SAN MIGUEL
SANTA ROSA
SANTA CRUZ
SANTA BARBARA
SANTA CATALINA
SAN NICOLAS
SAN CLEMENTE
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL

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LETTER OF TRANSMITTAL.

San Francisco, California.
June 30, 1914.

Honorable Hiram W. Johnson,
Governor State of California,
Sacramento.

Sir: In accordance with law, we submit for your consideration a statement of the transactions and disbursements of the board for the biennial term July 1, 1912, to June 30, 1914.

The report, we feel, covers fully the many operations of the board for the biennial period treated of, but there are certain features of it to which we desire to call your particular attention.

As the division reports show, much authority previously held by the head office has been delegated to the branch offices, in charge of individual commissioners and division chiefs. This new system has not only relieved the head office of a great many routine matters, but has given the several parts of the state local supervision of affairs, and some one in authority, always quickly and easily reached, to give information and settle disputed questions. The system also permits of a more satisfactory management of the patrol service, which consideration alone, in our opinion, more than justifies its added cost. The work of the various divisions has been not only highly satisfactory but has in fact shown a steadily increasing improvement. Consequently we feel justified in stating that there has been and is now a better management of the board's business than was ever possible under the old system of centering the control of affairs in a head office in charge of a chief deputy.

During the past two years the board has had at all times the services of an attorney, the wisdom of which plan is proven by the greater effectiveness of the patrol service and the more satisfactory handling of prosecutions. As this report shows, the board prosecuted during the two years just past 1993 cases involving violations of the fish and game laws, and out of this number obtained convictions in 1653 cases. The percentage of convictions obtained, 83 per cent, is, so far as we know, the highest ever obtained in the country by any fish or game board. During the period covered by this report, the board has been involved in some of the most important litigation in its history. The satisfactory termination of all this litigation should be sufficient evidence of the effectiveness of the legal department.

As stated by the Superintendent of Hatcheries in his report, it has been the purpose of the board to build up this department to the highest degree of efficiency. No effort or expense has been spared to give the entire state the best possible distribution of food and game fishes. The board believes also that more fish screens and fish ladders have been installed or authorized than during the previous history of the commission. In the opinion of the board, the work of the hatchery department during the past two years has been the most successful in its history. The Superintendent of Hatcheries can not be too highly commended for the splendid services given by him to the state during this time.

The board's operations in the field of game propagation and distribution have been less extensive during the past two years than for the preceding biennial term. The work of this department has been curtailed, primarily, because the purposes for which it had been created had been served and also because it has seemed desirable to reduce expenditures in this particular direction. The board's operations at the Hayward game farm have disclosed the fact that practically all of the foreign game birds hitherto imported into the state are unsuited to our conditions. A possible exception is the ringneck pheasant, which seems to be adapted to certain humid valleys along the coast. The board has hopes that the pheasant may establish itself in the state and prove a desirable addition to the stock of native birds.

The board has continued its policy of obtaining required data as to stream and water conditions, as is well set forth in the report of the Engineer-Draftsman. An effort has been made, also, to carry on a systematic inquiry as to fishery methods and conditions. A great deal of data has been collected and compiled by special assistants of the board and will be available for such use as the coming legislature may care to make of it. It is planned to give publicity to the fishery investigations through the medium of free bulletins, several of which are now in course of preparation.

One of the deputies has very kindly prepared an interesting paper dealing with the southern Sierras and the desert region, parts of the state of great interest to the fisherman and hunter, but which are not generally known and appreciated at the present time.

We desire to commend for your careful consideration certain contributed articles, the first dealing with "Arid California and Its Animal Life," written by Mr. Frank Stephens, a naturalist of note; the second, "California Fishing Industry from a Commercial Point of View," written by Mr. F. E. Booth, one of the principal commercial fishermen of the state; the last, "National Forests in California," which has been prepared at the board's request by Mr. W. C. Hodge, forest examiner of the United States Forest Service.

We are including in this report a roster of the board's employees as on June 30, 1914. On August 10, 1913, the board's employees and assistants were included in the classified list of state employees under civil service. Nothing that has happened in the forty-three years of the board's history has been fraught with such possibilities of good as this going under civil service. Every employee is now assured that the permanence of his position and the certainty of promotion are matters that rest entirely with him and not with some political power.

As will be noted, the board's revenues have been entirely derived from the sales of licenses, from fines paid into the state treasury for violations of the fish and game laws and from certain miscellaneous and unimportant sources. As a matter of fact, no appropriation of whatever nature or amount has been made for the board's maintenance since the legislative session of 1909. This policy has been based on the theory that fish and game conservation in California should be made self-sustaining, and that the burden of carrying on such work should be placed upon those who profit directly from a supply of fish and game in the state. Under this programme, the four thousand market fishermen, the one hundred and sixty thousand hunters and the eighty odd thousand anglers pay for their profit and pleasure, while the general public, which is only indirectly interested, is relieved of all expense.

Within the past two years the Board of Control has installed a very comprehensive and satisfactory system of records and accounts for the board. Through the use of this system the board is now able to publish each month a statement of disbursements covering every item of expense. It is believed that the hunters and fishermen, and the public as well, will appreciate this much needed provision for a monthly accounting.

Your attention is respectfully called to a comparative statement of the arrests made by this board for a period of twelve years, beginning with 1902. This statement shows that practically one fourth of the total of all arrests for the twelve years have been made during the last biennial term, and further, that almost one half of all arrests made in the said twelve years have been made during your term of office.

As the period covered by this report ends, the commission is reestablishing what in its opinion will become one of the most important branches of the service. The board has been fortunate in securing, as the head of the department, Dr. H. C. Bryant of the University of California, whose work will be the study of game life histories, the working out of methods of conservation and the instruction of the public as to the purposes of the work of his department. In his work Dr. Bryant will have the cooperation of university attaches and of the leading wild life conservationists the country over.

Very few recommendations as to new legislation are included in this report, the board preferring to collect all possible data as to conditions and to hold the same until called upon by the legislature for suggestions.

The board wishes at this time to express its appreciation of the splendid assistance received from state officers, boards and commissions, the universities, the United States Forest Service, and from the large transportation companies and many private citizens. The successful conduct of the board's business has always been and is now largely due to such cooperation.

In conclusion, we desire to state that the board has been actuated in its labors solely with the idea of conducting the affairs entrusted to it in such manner as to benefit all the people of the state, without regard to class or location. The laws have been enforced strictly but justly upon preserve member and unattached hunter alike, as the records will show. It can not be claimed with any degree of truth whatever that the commission has been subservient to any special class or interest, nor do we believe that the general public any longer looks upon the commission as being a class institution.

Respectfully submitted.

F. M. NEWBERT, *President,*
M. J. CONNELL,
CARL WESTERFELD,
Board of Fish and Game Commissioners.

By ERNEST SCHAEFFLE,
Executive Secretary.

Loch Leven trout from Big Pine lakes in Inyo County. Largest fish 5½ pounds. Planted by Fish and Game Commission in 1909.

DIVISION REPORTS.

SAN FRANCISCO DISTRICT.

By J. S. HUNTER, Assistant Secretary.

Game Conditions.

During the past two years, the game situation in the San Francisco division has been very satisfactory. There is yet an abundance of all native varieties of game and with some slight changes in the laws now in force a very considerable increase should be noted in all sections.

Deer.

In many sections the deer are far more abundant than they were a few years ago, but in other sections there has been a very appreciable decline each year. On another page is listed the kill of deer throughout the state. This list is based for the most part on the records obtained by our deputies. It is probable that the actual number killed would be double that given. From these figures it can be easily understood how essential it is that better protection be given if we are to retain one of the most valuable natural assets that we have in our state.

A suggestion has been made that the law prohibit the killing of spike bucks. If such a law were in force, it would decrease the number killed by at least one third. It would also reduce the number of does that are frequently killed by mistake, as it often happens that a doe is mistaken for a spike buck.

The present open season for the coast section is much too early. There is no place where deer should be killed as early as July first. The horns are in the velvet, very soft, and do not make attractive trophies. The season should be arranged between the time the horns become hard and the rutting season, as during the rut the flesh is strong and distasteful in flavor.

There has been no severe epidemic among the deer, such as occurred in Trinity and the adjoining counties during the summer and fall of 1911. It was reported, however, in the fore part of 1914 that the deer were dying in considerable numbers in the northern part of Sonoma and Southern Mendocino counties. It was impossible to carry on an extensive investigation, as reports were not received until after the worst of the trouble was over, but from the information gathered it would seem that approximately four hundred deer died. Some of those examined were infested by a small intestinal parasite, possibly that known as *Nematodirus filicollis.* This parasite occurs commonly in nearly all deer, and in this particular instance apparently developed in abnormal numbers, resulting in the death of the animals. It is not believed that this abnormal development was caused by any scarcity of food for the deer, nor to any severe climatic conditions, as the winter in that section was practically normal. It is interesting, also, to note that there was a severe loss in the same section by various sheep ranchers. One rancher lost over three hundred yearling sheep of apparently the same trouble. All of the deer that died were yearlings, except a few bucks and does on one of the larger ranches.

The small remnant of the Roosevelt elk, which are now found in the northern part of Humboldt County and in Del Norte County, seem to be increasing, if the reports received can be relied upon. We have no reason to suspect that any of these animals have been killed during the past two years. The people in the section where they range are in entire accord in giving them absolute protection. With this protection, there should be a rapid increase in their numbers as the territory over which they range is limitless in extent.

Valley and Mountain Quail.

Quail in the greater parts of the coast district are barely holding their own. The season for the taking of valley quail and the bag limit is greater than the supply of birds will warrant. It must be remembered that the best quail sections in Monterey and other counties were thoroughly combed over by the market hunters in recent years, and that the birds have not had an opportunity to increase on account of the great number of hunters who kill off every season so many of the breeding stock. The year of 1913 was a poor one for both species of quail, and in many sections they did not pair off, probably on account of the scarcity of rain. The present year, however, will probably be a record breaker, as young quail can now be seen everywhere.

Ducks.

In the bay region, the season of 1912-1913 was far more satisfactory than that of 1913-1914. Probably only one half the number of birds were killed during the latter year that were taken in the season of 1912-1913. It is impossible for us to determine the cause. There were in the season of 1913-1914 a greater number of canvasback. In fact, it is said that in the San Pablo Bay region canvasback have not been so abundant for years. Limits of this excellent duck were the rule rather than the exception in that part of the country for a number of weeks. The closing of the season at the beginning of February by the new federal law has been exceedingly beneficial, as greater numbers of ducks have been noted as breeding. Young mallards were seen in the Alviso Marsh in the early part of March, showing that the parents must have paired off not later than the month of January.

It should be mentioned that the first arrests for the violation of the federal game law in the United States were made by our deputies in the San Francisco Bay region. There was no difficulty in securing convictions in every one of the cases brought before the court, and it would seem that the sportsmen are in accord with the provisions of this new law.

Other species of game, rabbits, squirrels, doves, etc., can be found in abundance in practically every county of the district; even in counties that are adjacent to the great population of the bay region there are many places where good shooting can be had.

Ringneck Pheasants.

Very encouraging reports have been received from the plants of pheasants which have been made in various parts of the state. The area that is adapted to the peculiar requirements of these birds is limited, consequently they probably never will range throughout the state. After they have established themselves in the well watered valleys where insect life is abundant, they may extend their range into the rougher foothills, but it is impossible to start them successfully upon the brush covered hills.

During the past several years, over four thousand pheasants have been liberated. This number, together with those raised this year, will be sufficient to show whether the species will find conditions adapted to a prolific increase.

The Work of Deputies.

The deputies throughout the San Francisco District have without an exception, been doing excellent work. Particular mention should be made of the work in Humboldt County, where, on account of the conscientious manner in which the deputies have worked, they have moulded public opinion so that convictions are the rule, rather than the exception, as they were in former years. Some of the largest fines in the history of the commission for the possession of deer meat during the closed season have been imposed in this county. This change of public opinion has not been confined entirely to Humboldt County. In Mendocino County a hotel proprietor, who was charged with having deer meat in his possession during the closed season, demanded a jury trial, was convicted by a jury of his fellow townsmen, and was fined a substantial sum by the justice, also a fellow townsman.

Great credit should be given to Mr. Frank C. Clarke in this case, as it was based entirely on work that had been done by him. Through this work it is now possible for us to positively identify a piece of venison, no matter how cooked or treated.

The work of the deputies in San Francisco has also been particularly gratifying. This has been brought about by the heartier cooperation of the courts. During the season three years ago there were fully 250,000 wild ducks brought into the San Francisco market for sale. Previous to that time, there had been organized, to get around the bag limit law, a system of "game transfer companies." It was impossible for the commission to break up these companies until the fall of 1913, when a decision rendered by one of the superior judges showed that they were organized merely to evade the law and recognized the power of the commission to confiscate all ducks that were shipped to them. The total receipt of ducks in San Francisco during the season of 1913, including those shipped in by the market hunters and those shipped by resident sportsmen, was scarcely one third of those shipped in when the game transfer companies were running without hindrance. This can not be attributed entirely to the scarcity of ducks; but credit should be given to the superior judge who made it possible to break up the game transfer companies.

Hancock Lake, Siskiyou County, in Sacramento District; headwaters of Salmon River. Stocked with black spotted trout from Sisson hatchery.

Falls of South Fork of San Joaquin River. Headwaters of stream stocked with Golden trout in 1914.

United States Forest Service Bridge on upper San Joaquin River.

A RESUME OF WILD GAME AND THE CONDITIONS PERTINENT THERETO IN NORTHERN CALIFORNIA.

By GEORGE NEALE, Deputy in Charge, Sacramento District.

The Sacramento Administrative District of the Fish and Game Commission is composed of the following counties of the First Fish and Game District: Siskiyou, Modoc, Shasta, Lassen, Trinity and Tehama; the following counties of the Second Fish and Game District: Glenn, Colusa and Yolo; the following counties of the Third: Plumas, Butte, Sierra, Sutter, Yuba, Nevada, Placer, El Dorado, Alpine, Amador and Sacramento; also San Joaquin County in the Fourth Fish and Game District.

Thus this administrative district comprises twenty-one counties covering an area of 44,174 square miles, or approximately one third the total area of the state. The district is under the supervision of the President of the Commission, Mr. F. M. Newbert.

Feed Conditions and What They Make For.

The abundance of fish, game, birds or animals in a wild state is determined largely by the quantity and character of food that nature provides. The counties of the Sacramento District are particularly favored in this respect, furnishing an abundance of the foods necessary for fish, animals and birds. The skilled deer hunter goes to the range or mountain hillside where the browsing is abundant, for there he knows the deer will surely be, especially in the early morning feeding time and during the dark of the moon. Likewise, the duck hunter who is experienced will prospect the lakes and ponds before the arrival of the ducks, geese, etc., from the far North for indications as to the supply of the rich grasses, seeds, roots and bulbs most sought by water fowl, well knowing that upon these depend the appearance and stay of birds in this locality. The higher altitudes of this district furnish a great supply of wild fruits, berries, seeds, bugs, grasshoppers, etc., of which sage hens, grouse and mountain quail are very fond. That portion of the Sacramento and San Joaquin delta before the era of reclamation was a veritable paradise for wild fowl, and to a great extent still furnishes a food supply for a large number of ducks, geese, swan, sandhill cranes, and other water fowl. All the reeds, seeds, bulbs, and succulent water grasses, except wild rice, known to the Eastern and Middle States and classified by the Department of Agriculture grow in the greatest luxuriance. Many varieties of roots and grasses which I am unable to identify are also much in evidence. The most important of these duck foods are the two varieties of what is known locally as "tule potatoes," or bulbs and classified as *Sagittaria latifolia* and *Sagittaria arifolia*. The next in importance perhaps is the wild celery seed or bean, *Vallisneria speralis*. The writer once killed a canvasback with forty-one of these beans in its gullet. Ducks arriving in poor condition on these feeding grounds will get quite fat in a few days. The most plentiful is the tuber, known as the *"wapata."* These tubers grow in such quantities in the Sacramento delta that many tons are annually dug by Chinese and shipped to San Francisco for the Japanese and Chinese, by whom they are highly prized for food. There is the wild millet, the sago weed, what is known locally as gray duck food, perch grass weed, what is known as the yellow lily pad (*Nymphæ flava*) seed, which is very abundant in some localities and furnishes a great amount of food, especially favored by wood ducks, and many other seed bearing grasses, too numerous to mention.

The variety of food on which wild ducks feed depends entirely on the depth of water. All the deep water or sea ducks are able to procure their food at from one to ten feet of water, while the waders, mallard, sprig, teal, etc., feed on what can be obtained in shallow water, at from a few inches to two feet, or on what remains on the surface after being pulled loose by the diving ducks. Wild celery has been introduced in several parts of California, but so far with little success, owing, no doubt, to a lack of knowledge of the conditions necessary to insure its successful growth. Circular No. 81 issued by the Bureau of Biological Survey, U. S. Department of Agriculture, gives valuable information as to planting of this seed. Some objection has been raised to the introduction of this seed into California owing to the fact that carp are very partial to it, but there are many varieties of native seeds and grasses which may be successfully planted that carp can not destroy, as is shown by the large crops of duck feed found where carp are abundant. Many of these seeds, roots, etc., may be obtained in the fall of the year, especially from the territory bounded by Cache and Miner sloughs and the Sacramento River. The amount of reclamation being done in overflowed lands will necessitate the planting of this wild feed in waters barren of such seed. Wild ducks demand other feed besides grain as fed by some gun clubs. Of the cultivated grains, mallard and sprig show a preference for cultivated rice.

Fish and Game of the Sacramento Administrative District.

In describing the varieties of game to be found in this district it is not my intention to undertake an analysis or classification of species, etc. I will describe only those which have come under my observation in thirty years' experience in much of the territory under consideration, as well as under the observation of the old hunters and deputies of the Fish and Game Commission.

The classification of the different varieties of deer, bear, etc. is as yet incomplete and largely matters of personal opinion not yet settled. I have seen a female black bear with a black and brown cub and a brown bear with two black cubs. What should concern us most is that a bear, deer or other animal of any kind is a valuable asset to California. I care nothing for the resemblance of one species of deer to another species as long as it is a deer and a good deer. All deer are beautiful and, unfortunately for them, are considered desirable game and good for food.

Large Game Animals.

Numerous varieties of game animals are peculiar to this portion of California. In some counties their numbers are increasing, on account of the wise legislation protecting these animals, and the vigorous prosecution of violators by the Fish and Game Commission, with the cooperation of the prosecuting officers of the several counties. Public spirited citizens have realized what a great asset the fish and game are to the state. It is a magnet which draws the people to the mountains with gun, rod or camera, and is an incentive for outdoor life and health. Remove the fish and game and that incentive will no longer exist.

Deer are to be found in all the twenty-one counties of the Sacramento District; the counties containing the greatest number are doubtless in the eastern and northern part of the state. Along the northern line may be found the large mule and black tail deer, while in the eastern portion may be found the black tail and, occasionally, the large white tail. It is claimed there are other species of small deer, known locally as chemise and chaparral—deer which do not attain a large size are to be found in Nevada, Placer, El Dorado, Amador, Glenn, and Colusa, or at an elevation generally at from eight hundred to thirty-five hundred feet.

Space will not permit giving the various localities where fish and game most abound. There are many booklets issued by the several railroads and various promotion bodies that may be had for the asking. All are reliable and written by authorities who know the game by experience.

From reliable information it seems that the remnant of the antelope in Siskiyou County are increasing in number. There are about three hundred in several bunches, seventy-six being counted recently by one of the commission's deputies in that county.

The elk liberated in Shasta County are increasing; a number of calves having been seen recently. These two last named animals are protected by stringent laws, as are does and spotted fawns of all our deer.

Black and brown bear are numerous in portions of Siskiyou, Modoc, Lassen, Trinity, Tehama and Shasta counties. From reports a few grizzlies still remain in Trinity and Siskiyou counties, together with a large number of smaller mammals, some of them highly predatory.

Upland Game Birds.

Among the feathered and furred game of the upland or mountain are to be found the blue grouse, sage hen, and mountain quail. At a still lower altitude, from sea level up to three thousand feet, may be found anywhere the valley blue quail, possibly the grandest game bird in the world. He will put to the test the nose of the trained pointer or setter and the eye and nerve of the hunter as no other game bird can—a game bird in all that the word implies—and always capable of caring for himself under any and all conditions.

Marble Mountain in western Siskiyou. A great game country.

The wild or band-tail pigeon is yet in evidence at some seasons. This bird is now protected by federal law.

Rabbits of several varieties, as the jack rabbit, the red hare, cottontail, bush rabbit, and the gray squirrel are numerous in many sections.

Group of Waterfowl.

Of the migratory game and waterfowl, classed as such under the federal regulations, although many are habitant to California, are the mallard, sprig, gray duck or gadwall, widgeon or ballie, spoonbill, blue wing, green wing and cinnamon teal, wood duck, canvasback, redhead, blue bill, black jack, ruddy duck or wire tail, and many other small varieties, coot or mudhen, etc. Of geese, there are the honker or Canada goose, the big brant or Mexican, one of the smaller size and the lesser brant or yelper, two white or snow geese, the large and small, the speckled breast or gambel goose, also a large gray goose resembling the gambel goose, but much larger, weighing as much as ten pounds or more; local name tule goose. This goose is devoid of the large black feathers seen in the breast of the gambel at any age. It has a different call or cry, and is easily decoyed by call. This goose and one of the brant are not described or identified by any one, as far as I can ascertain.

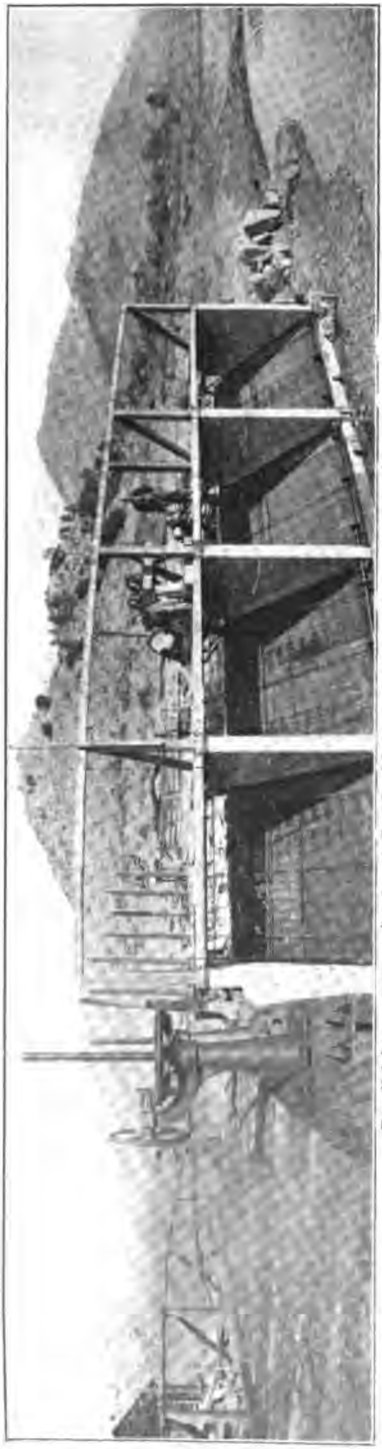
There is the white swan, the sandhill and other cranes, nearly all the shore birds, the king of all, the Wilson or English snipe, which, with the yellowleg and robin snipe, are most abundant of all. There are golden, black-breasted, ringneck, bullhead and other varieties of plover, snipe, sandpipers, ibis, curlew, stilt, avocet, herons, bittern, mergansers, terns, loons, divers, grebes, pelicans, cormorants, etc.

Waterways and Fishes.

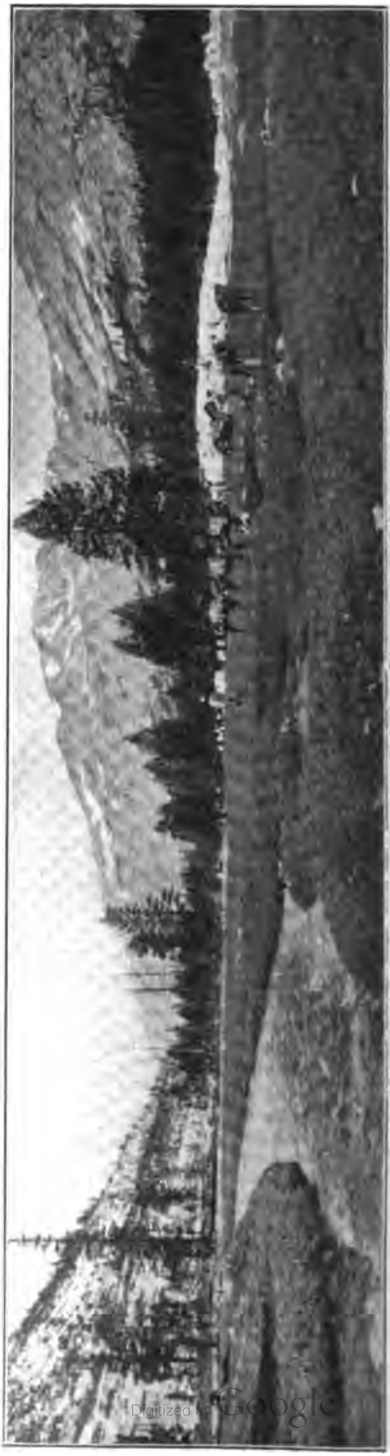
The Sacramento District possibly furnishes a greater mileage of streams and a larger acreage of lakes capable of sustaining fish life than any other like territory. In this district there are said to be 14,500 miles of streams, besides 400,000 acres of lakes, nearly all the habitat of some varieties of fish. The higher regions are the homes of the black spotted, rainbow, Loch Leven, eastern brook, dolly varden, mackinaw and other trout. Many of the upper lakes have been stocked with the gamey large and small mouth black bass. The rivers, lakes and creeks at a lower altitude also furnish the angler with the finest of black and striped bass fishing.

The Sacramento River, being the highway of the quinnat salmon between the Pacific Ocean and the spawning grounds on the numerous cold streams of the tributaries of the Sacramento, is, during the running season, filled with the choicest of salmon, shad, striped and black bass. The introduction of foreign fish into our waters about two decades ago has proved a grand success. These are the shad, striped bass, two varieties of catfish or bullheads, crappie, blue gill, yellow or ring perch, black bass, both of the large and small mouth varieties, besides the large variety of fish native to our rivers. The sloughs tributary to the lower Sacramento and San Joaquin rivers, in Yolo, Solano, San Joaquin and Sacramento counties, afford striped and black bass fishing unsurpassed anywhere. Striped bass are frequently taken with rod and line weighing as high as forty pounds, while black bass of nine pounds are common. The striped and black bass have both penetrated the upper tributaries of the Sacramento River. They are now found two hundred miles up stream from Sacramento city, being especially abundant in season in the American, Feather and Yuba rivers and smaller tributaries. Fortunately, their zone ends where the trout waters commence.

Altogether, the twenty-one counties of the Sacramento District afford the rarest opportunity to the naturalist, the ornithologist and ichthyologist. Should this territory not satisfy him, then he is hard to please indeed.



Parallel bar screen at intake of Pacific Light and Power Company's canal near Kernville.



Piute Creek (San Joaquin River watershed). Planted with Golden trout in 1914.

FRESNO DIVISION.

General Conditions and some Important Problems.

By A. D. FERGUSON, Assistant Commissioner.

Fish in the Valley Streams.

The fishing conditions in the valley section of the Fresno Division are at once important and peculiar. Important, for the reason that many thousands of people in all walks of life, coming from grain ranches, farms, hamlets, and the larger cities, find throughout the fishing season pleasure and recreation along the banks of the two great rivers of the valley. Peculiar in that, due to the diversion of the waters for irrigation purposes, both the San Joaquin and Kings rivers are dry throughout a portion, at least, of their lower courses, almost every fall.

In addition to this natural hazard, two fruitful causes have militated against the existence of fish life in these rivers, to wit, the operations of market fishermen and the absence of screens across the inlets of the various irrigating canals. It would seem hopeless to expect good fishing at any time under such conditions as prevail in these two rivers, and it speaks volumes for the prolificness of these waters that a reasonable supply of fish life has been maintained from year to year. The first of these two chief causes for the destruction of whatever fish life can exist under the natural conditions, has been partially overcome by the action of boards of supervisors in some of the valley counties in forbidding, by ordinance, the use of seines or nets in the taking of fish. The screening problem is now in process of adjustment, through the activities of the Fish and Game Commission.

Effects of Market Fishing.

The Fourth Fish and Game District embraces all of the waters of the valley section south of the San Joaquin County line. The interest of the people in fishing conditions in the local waters is almost universal, and to them the fish are an important and valuable natural resource, not as affording opportunity for a commercial industry, but as an object of pleasurable pursuit and offering an incentive to many outings. Certainly, the waters of the Fourth Fish and Game District are not of sufficient magnitude to maintain a commercial industry of any importance, and if left to their own devices, the market fishermen, while their number is comparatively limited, can, by reason of the fact that the fish during the low water period are congregated in a comparatively few holes and pools, easily capture all of the fish life in these waters. Nor is the damage confined alone to the low water season. The drawing of seines for the purpose of taking even the less valuable fishes, such as carp, works destruction to the future black bass supply by disturbing or destroying the nests of the bass. Hence no form of commercial fishing can be indulged in in these waters without working injury to the general fish supply. Up to the time when some of the valley counties undertook to conserve the fish supply by passing ordinances forbidding the use of seines and nets in the taking of fish, all of the indigenous fishes were in imminent danger of speedy extermination. The counties of Kings, Tulare, Fresno, Merced and Stanislaus have passed anti-seining ordinances, and the effect has worked great good in those counties whose ordinances have been longest in existence. But since the validity of county ordinances for the better protection of fish and game has been seriously questioned, there should, by all means, be a state law enacted forbidding the taking of any variety of fish at any time by means of seines, nets or traps of any description. The passage of such a law would not displace an industry of any commercial importance. As a matter of fact, the total revenue derived by the state from the sale of commercial fishing licenses in the whole Fourth Fish and Game District is less than $400. On the other hand, while working incalculable benefit to the people of the Fourth District, the cessation of commercial fishing would permit of many salmon reaching the spawning waters of the upper rivers and thus much good eventually be done the general commercial fishing industry of the state.

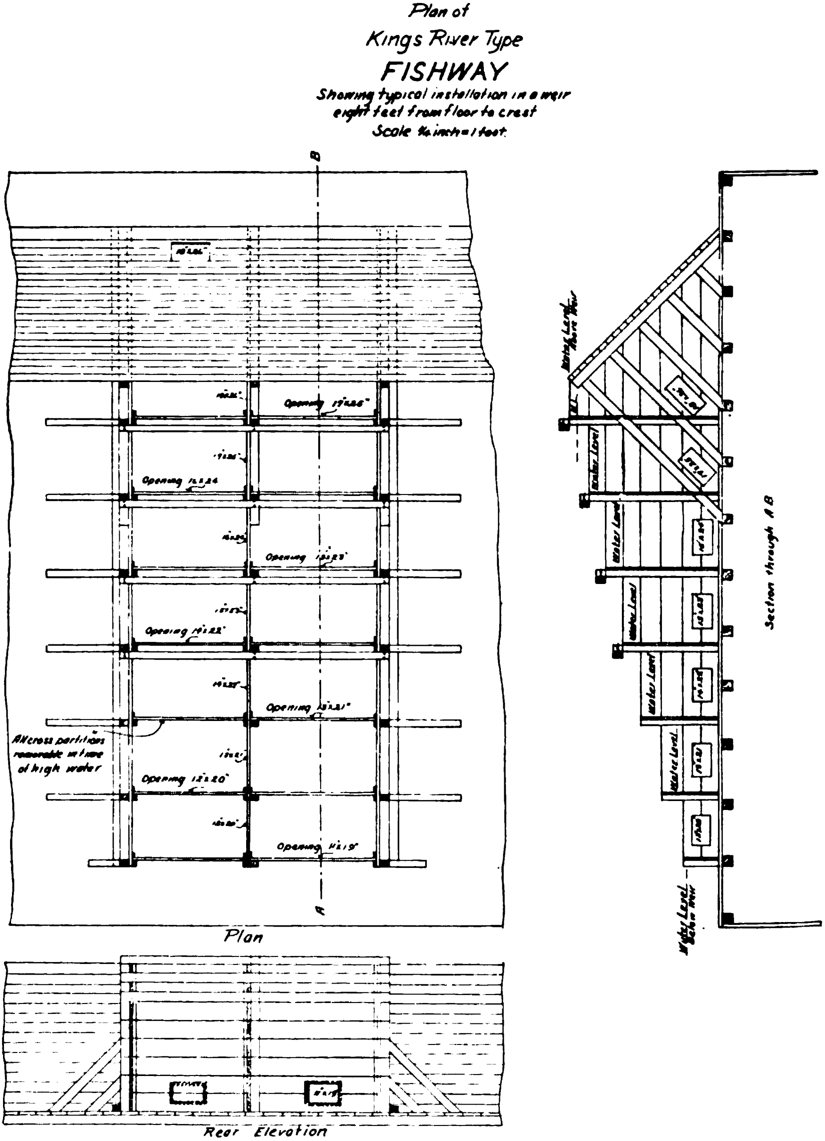
Screens.

The destruction of fish life in the many irrigating canals has been a serious drain upon the general supply. In the spring of the year the fish descend these canals in large numbers, probably in search of food, and when the canals are turned dry in the fall the annual destruction of fish life is appalling. Until the year 1913, no demand had been made by the Fish and Game Commission for the installation of screens across the inlets of the canals for the reason that no adequate screen had been devised which would effectively exclude fish from the canals without seriously interfering with the flow of water. Recognizing the prime importance of the horticultural interests, the commission was loath to take any action which might possibly stop the flow of water in the canals, since not only the material prosperity but the very existence of the population of the valley depends upon the irrigating water. It should not be understood, however, that the matter had, in the interim, received no attention by the commission. Many experiments were tried looking to the securing of an adequate screening device, particularly in the Fresno Division. Mr. W. H. Shebley, Superintendent of Hatcheries, and members of his staff, have succeeded in perfecting a parallel bar device with an automatic cleaning attachment which is thoroughly adapted to the purposes for which it was intended. The important departure, and the successful feature, of the new device, is the dropping of the mesh screen and the substitution of parallel bars of $\frac{1}{16}$ inch by 1 inch galvanized iron, bound together in sections by means of stay rods, and the proper opening between bars secured by the use of burrs between the bars. The space between the bars is usually one fourth of an inch. It has been proven that this type not only offers less resistance to the flow of water but also has no tendency to choke up with trash and slickens as is the case with square mesh screens. This device has the further advantage of being easily cleaned, in contradistinction to a mesh screen, for the cleaning of which no adequate device has ever been found. An automatic cleaning device has been perfected by Mr. R. W. Requa of the hatchery force. This device involves the use of angle iron rakers attached to sprocket chains which are driven at slow speed by sprocket wheels set on shafts top and bottom at both ends of the screen. The mechanism can be driven either by a small electric motor or by a waterwheel set in the canal itself. The angle irons drag over the face of the screen and carry off any trash which may have collected thereon. The total displacement of water by this type of screen is about 8 per cent; hence, in order to permit the passage of water through the screen without increasing the pressure, it is necessary only to place the screening device in such position as to occupy 8 per cent more of the river channel. In practice, canal companies usually allow a somewhat greater percentage for displacement. This type of screen is being rapidly installed throughout the division, and the ultimate effect upon the fish supply will be highly beneficial; for although the lower waters of these rivers may go dry, yet above the point of last diversion of water there will always be sufficient living water in the river channel to carry a sufficient number of fish to perpetuate the supply.

Fishways.

The problem of providing fishways upon the diverting dams and weirs of these rivers was also unique. Although artificial fishways have been in use for three hundred years, all of the various types of fishways heretofore used have had to do with dams having a permanent level, such as concrete and masonry dams. But in the rivers of the San Joaquin Valley the prevailing type of weir provides for a varying height. The canal inlets are usually constructed to receive water at what may be called a mean high water level. The water level at the inlet of the canal is maintained by raising or lowering the height of the diverting weir. To accomplish this, removable boards called "flash boards" are inserted or removed in the face of the weir. Thus it may happen that the actual height of these weir boards may vary several feet in a day. No type of fishway heretofore invented could be made to conform to this condition of varying levels. To meet the situation, an entirely new type of fishway was evolved, after many experiments, by

Messrs. Ernest Schaeffle, executive secretary of the commission, and Deputies E. W. Smalley and A. D. Ferguson of the Fresno Division. The construction of this fishway, now called by the Fish and Game Commission the "Kings River fishway," is shown by the following drawing.



The principle involved is, that the pressure in any of the openings in the bottom of the fishway between compartments is equal only to the hydrostatic pressure of a column of water whose height is the difference between the water level in one compartment and the water level in the next compartment above; the same being true of the last compartment and the river level itself. This permits ascending fish to pass through the dam on the bottom level of the stream instead of passing *over* the dam as in other fishways. This regular procession of increased water levels in each succeeding compartment is secured by reducing the dimensions of each outlet opening. The evolution of the Kings River type of fishway is somewhat interesting. Starting with the theory that if a succession of single compartment pools, each one foot lower than the other, were constructed in such manner that if a small volume of water were permitted to overflow from the river into the first and thence into the succeeding pools, and if an opening were cut in each of the pools flush with the bottom of the river, then, so long as there was an overpour from one pool to the next, the pressure in the bottom openings would be equal only to the hydrostatic pressure between pools —in other words, a column of water one foot high. By experiments it was demonstrated that if each pool were divided by a lateral partition into two pools, and an opening of the same size as the other bottom openings were cut through this partition, the pressure in the openings could be further diminished. This led to the further experiment of decreasing the size of the outlet bottom openings one inch in each dimension in a regular ratio between each set of double compartment pools, leaving the opening in the lateral compartment the same size as the inlet opening next above. The result proved that the desired difference of water levels between the compartment pools could be maintained without any overpour from the river, and without increasing the pressure in any of the fishway openings. The velocity of the water in passing through the openings in the pools in this type of fishway does not exceed four feet per second, and this permits of the passage of even the most sluggish of fish through any weir, no matter what its height. There is practically no limit to the possibilities of this type of fishway. On extremely high dams, it would become only a matter of expense. On board weirs, up to a height of twenty feet, the expense is comparatively trifling.

Tulare Lake.

Tulare Lake has always been an important factor in the conditions affecting fish life in Kings River waters. To a lesser degree this is also true of the Kaweah and Tule rivers. After a succession of wet years, this large, shallow lake, approximating twenty by forty miles in area, has afforded a haven for vast numbers of Sacramento perch, catfish, black bass, Sacramento "pike," and many fishes of minor value. With the advent of the spring freshets the fish of the lake have annually migrated to their spawning grounds in the streams which feed the lake. Nowhere else in the state have Sacramento perch and catfish been found in such numbers and of the size of these Tulare Lake fish. Unfortunately, the dry seasons of 1912 and 1913 were accountable for the almost total disappearance of what had once been a lake of large proportions. With the drying up of the waters of the lake, hundreds of tons of valuable food and game fishes were destroyed. In this year, 1914, a large volume of water has been poured into the lake, which will make it again a sea of water of considerable size and importance. But its future existence depends upon two factors; *first,* a succession of wet seasons; and, *second,* whether or not the flood waters of the feeder rivers, particularly Kings River, shall be diverted from the lake and thrown into the San Joaquin River in order that the lake bed may be reclaimed for agricultural purposes. Very naturally, since the bed of the lake, when dry, is agricultural land of wonderful possibilities, it is but a question of time when all or practically all of the lake bed will be reclaimed by the agriculturists. Already, a great drainage channel is being constructed which, while primarily intended to reclaim other lands, will have a tendency to divert the flood waters of Kings River from the lake to the San Joaquin River. While the effect of this will preclude the return of the old-time favorable conditions for fish life at the same time it will not be without its compensations. The setting up of a well defined current from Kings River into the San Joaquin will undoubtedly attract a run of salmon, striped bass and possibly shad, into Kings River. It is worthy of being recorded that this reclamation work is already responsible for a noticeable run of salmon from the San Joaquin into Kings River. Prior to the year 1911, salmon did not enter Kings River, due to the fact that although the two streams were directly connected, there was no perceptible current for many miles throughout the swamp and overflowed section lying between the San Joaquin River at the mouth of Fresno slough and Summit Lake, which was once the dividing line where part of the waters of Kings River discharged toward the San Joaquin, while the rest of the Kings River waters flowed into Tulare Lake. In the spring of the year 1911, due partly to the partial confinement of these Kings River flood waters into one channel, and partly to the fact that the Miller & Lux dam checked the current of the San Joaquin River for a considerable distance above the dam, a few salmon, confused, no doubt, by so much still water, found their way into the connecting channel of Kings River and thence into Kings River as far up as the town of Laton. The following year, for the first time, a very considerable run of salmon actually entered Kings River and ascended the stream to a point at least as high up the river as Trimmer Springs, being some 125 miles from the point where Kings River enters the San Joaquin channel. In 1913, due to the dry season, no Kings River water entered the San Joaquin River, but in June of this year a very considerable run of salmon again appeared in upper Kings River.

Food Value of the Fish.

While the value of the fish life in the rivers of the Fourth Fish and Game District is chiefly in the opportunities for sport and pleasure offered the population, at the same time the food value of these fishes is not inconsiderable. In the favorable fishing season of 1911, the waters of lower Kings River were literally alive with catfish, Sacramento perch and black bass. Hundreds of people from points within a radius of fifty miles of the river, taking advantage of the presence of such large numbers of fish, took, with hook and line, not only enough fish for their own immediate needs, but often fish in quantities for distribution to their neighbors. At the weir of the Empire Land and Water Company near Tulare Lake, a daily average of 400 to 500 persons fished from the banks of the river for a period of two months. Whole families were camped there from Friday evening until Monday morning and every one apparently was able to take, with hook and line, all of the fish which they could carry away with them. While black bass and Sacramento perch were plentiful, catfish largely predominated. These catfish so caught were from two to twelve pounds weight, and it was estimated by deputies of the Fish and Game Commission, who were constantly stationed at that point, that in two months from one half mile of the river waters, 150 tons of catfish alone were taken with hook and line.

The Future Prospect.

Although the unusually favorable condition last described probably never again will obtain, at the same time it is possible, by the stoppage of commercial fishing, the screening of the canals and the establishment of practical fishways, to restore and maintain, for a great many years, a high degree of excellence of fishing conditions throughout all of the lower waters of the rivers of the Fourth District. A new factor must, within a few years, enter into the general situation. It is more than probable that great storage reservoirs will be constructed to impound the flood waters of the more important rivers. The trend of public opinion seems to be that while impounding the flood waters of these rivers for the purpose of providing a regular and sufficient flow of water for the irrigating canals, the navigation interests shall also be considered. No doubt the flood waters can be so conserved and distributed that a regular flow can be maintained sufficient not only to provide water for all of the irrigating canals, but to provide a perpetual flow throughout the whole length of the river channels. The beneficial effect on fish life of such a system, should it ever be inaugurated, is apparent.

Water Diversion for Power Purposes.

Whatever may be said of the necessary sacrifice of fish life in the streams of the valley section by reason of the diversion of water for irrigation purposes, the situation is different in control and in principle with regard to the streams of the Sierra Nevada Mountains. In the valley section, the water diverted from the streams by means of irrigation canals is spread upon the land and does not return to the streams, but the water thus diverted is necessary to the very existence of the population. In the mountains, water is usually diverted for the purpose of developing electric power, and returns eventually to the natural channels. Here, since the water is not lost but diverted and returned to the channels, the problem of conserving the fish life in the streams is simple in principle, but even more important than the similar problem in the valley section, because, with proper regulations, the fish life can be forever perpetuated; while it is conceivable that the time may come when all of the lower waters may be used for irrigation. Nor does the principle of the greatest good to the greatest number apply alike to the use of water by irrigationists and power companies. In the first instance it amounts practically to a public use of a public resource. Irrigating canals in the San Joaquin Valley are operated under legally organized irrigation districts, cooperative companies of horticulturists or by public service corporations selling water, usually, to holders of water rights whose money actually dug the canals. Thus, in any event, the ownership of the land and the use of the water are intimately related; while in the second instance the enterprise is wholly commercial. The capital invested bears a different relation so far as the public is concerned, and while power companies are public service corporations, the electric power developed by the diversion of the stream does not necessarily make for the benefit of the people who live adjacent to its banks. As a matter of fact, the biggest power projects in the Sierra Nevadas were inaugurated for the purpose of developing electricity to be carried on wires, entirely away from the San Joaquin Valley.

The problem, then, of water diversion for power purposes with relation to its effect on fish life, may be safely treated as separate and distinct from the diversion and use of the same water after it reaches the valley section.

The effect of water diversion for power purposes, presents many complications. For instance, and, illustrating from actual conditions, if a comparatively small percentage of the minimum flow of a natural trout stream is diverted, no harm results. If a storage reservoir is constructed across the head of a precipitous, rocky gorge, which naturally presents a series of falls impassable by fish and after being used to generate electric power, the water is returned to the channel at a point more favorable for the existence of fish, great good has been done to the fish interests. For while the fishing waters destroyed by the diversion of the water from the section of the stream where conditions for the existence of fish life are not good, is negligible, the lower section of the channel is not affected, and the storage reservoir, if large, will support infinitely more fish life than could have existed in many miles of the stream under natural conditions. Again, if all of the minimum flow of a minor stream is diverted at a point which practically marks the limit of the downward migration of trout, and which is above the limit of the upward migration of the fishes of the lower river, no great amount of harm has been done. But throughout the mountains there are trout waters of such importance that the public interests will be irreparably damaged if a considerable portion of the channels of such streams were to be dried up because of the diversion of water for power purposes. And such streams, by reason of the fact that they occupy the bottoms of deep canyons where erosion has reduced the fall of the stream to comparatively slight proportions, if diverted for power purposes, will not be returned to the original channel for many miles. The development of power by falling water in our mountains is simply a question of contours. If water is diverted from a stream at the head of a succession of falls or rapids, and carried in conduits nearly on a contour level, it need not be taken a very considerable distance until it shall have attained a level a thousand feet or more above the bed of the stream. Naturally the largest streams occupy the deepest canyons where the grade is the slightest; hence, the water diverted from such streams must be carried a great distance before it will have attained a height above the canyon floor sufficient for the purposes of developing a large amount of hydroelectric power. And naturally, too, those who would develop hydroelectric power are attracted to the streams carrying a large volume of water; and therein is the menace to the people's interests, since such streams carry the greatest amount of fish life. Typical instances of this, the most important condition, are found in Kern River from Kernville upward; in Kings River from Redhill upward, and including its main branches; and in the San Joaquin River from the town of Friant, almost to the sources of the main branches of the said stream. These rivers and their main feeders teem with fish life, and are among the most important trout waters of the state. The fish which abound in these waters are not only a resource of great immediate importance to the people of California, but are of potential importance impossible to measure in figures of dollars and cents. In all reason, this fish life must be conserved.

That the fear that the waters of such typical streams may be diverted to the detriment of the fish interests is well grounded, is evidenced by the fact that on Kern River above Kernville, preliminary construction work has already been started to divert, by a large ditch, Kern River water for power purposes. Apparently no storage reservoir is provided for, and if the interested power company is permitted to divert all of the minimum flow of the river, the fish life in sixteen miles of what is now one of the finest trout streams in the state will be destroyed. Although the maximum flow of Kern River at the point of this proposed diversion is several thousand second feet, yet the minimum flow recorded on the government gauge in 1913 was 334 feet for a period of about ten days. It is quite conceivable that a hydroelectric plant would require all of this minimum flow if a full degree of efficiency were to be maintained. Furthermore, it is generally understood that engineers have, at the behest of a power company, made surveys which contemplate the diversion of Kern River water still thirty miles above the intake of the proposed diverting ditch last named. If this were the only important trout stream threatened, the situation would be serious enough, but unfortunately it is more than possible that in the race for hydroelectric power development throughout the Sierra Nevada mountains, similar projects will be undertaken on other equally important streams and on a scale of such magnitude as to make difficult the obtaining of sufficient water for the power plants without taking all of the minimum flow of the streams.

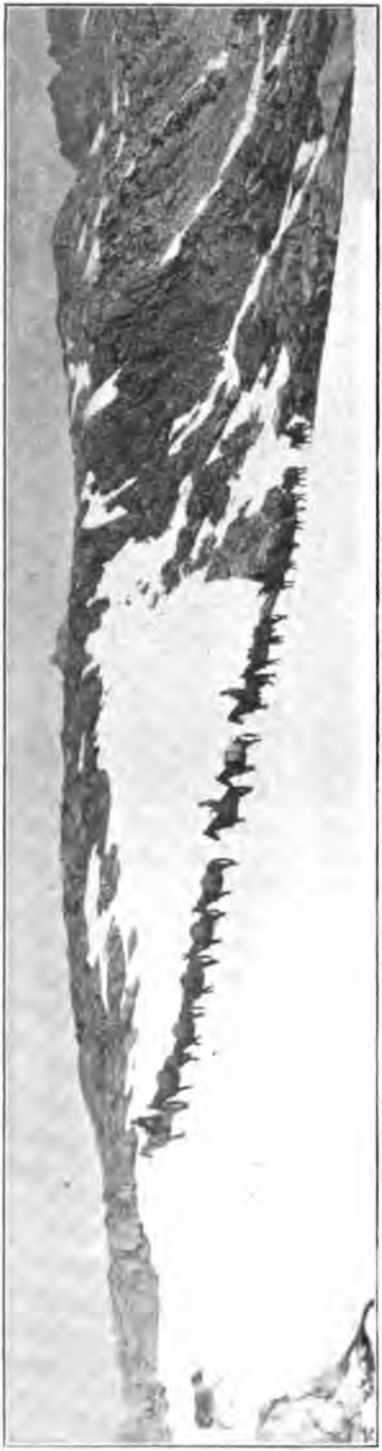
Kern River near Fairview.

To meet the situation, the Fish and Game Commission will insist upon the strict observance, in spirit as well as in letter, of the law compelling the installation of fishways upon all dams. The law requires that the owners or occupants of all dams or artificial obstructions in all rivers of this state, naturally frequented by migratory fish, must construct and maintain durable and efficient fishways in accordance with the plans and specifications as determined by the Fish and Game Commission, and such fishways must be kept open to the free passage of fish at all times. Ten per centum of the minimum flow of a mountain stream passing through a fishway might be sufficient to permit the free passage of fish throughout the stream channel below the point of water diversion, and thence over the obstruction. The matter is so important that the right of the people to insist upon the preservation of the fish life in our mountain streams, must be jealously guarded, and if necessary, more firmly established by further legislative acts. The principle should be fixed by law, that there must at all times, in all trout streams, be a sufficient minimum flow of water passing any diverting dam or intake canal to insure the perpetuation of the fish life from the point of diversion to the point where the diverted water is returned to the natural channel.

It must not be taken for granted that a law to provide for the absolute protection of the fish life will prevent or seriously interfere with hydroelectric power development in the state. When the percentage of the minimum flow of any stream which must be permitted to remain in the channel is fixed by law, engineers, in figuring on the development of a certain amount of hydroelectric power, will plan either to store by reservoirs a sufficient amount of the flood waters of such stream to provide a constant minimum flow, or will plan a succession of power house sites at descending levels along the course of the stream the waters of which are to be used. It will then become a question of expense. But the people's rights are supreme in all instances and such expense should be taken into consideration by the projectors of future hydroelectric enterprises.

Trout Planting.

·The work of reaching and planting, with desirable varieties of trout, the barren waters of the higher mountains, progress in which has been set forth in previous biennial reports, has been consistently carried forward. It would require a study of a topographic map of the mountain region to obtain any adequate idea of the magnitude and importance of these operations. As stated in previous reports, only those few main channels which occupy the beds of deep canyons in the Sierra Nevada Mountains, where no impassable fall exists between the point where the trout are found and the ocean, naturally contained any fish life. The feeder waters of this vast watershed, coming into the main channels over high and impassable falls, were naturally devoid of fish life of any kind. To reach and plant with desirable varieties of trout, these barren waters, has been the fixed policy of the Fish and Game



Fish and Game Commission's 20-mule pack-train crossing Piute Pass. Elevation 11,400 feet. Train carrying Golden trout.

A pool below Jackass Falls on South Fork San Joaquin River.

Commission since the organization of the Fresno Division. Since there are no wagon roads in existence, the transportation of trout involves packhorse distribution. With surprising celerity the public has discovered the fishing thus established in previously little known streams, and many thousands of people from the adjacent valleys now annually visit, in pursuit of pleasure, streams which, until placed there by the commission's deputies, contained no fish life. Nor are the streams alone important. In the higher mountains of the Fresno Division there are over 1,000 lakes and lakelets, most of which are adapted to the existence of fish life. A great many of the more accessible of these lakes have already been reached and planted with rainbow, Loch Leven and Eastern brook trout. In the watersheds of the Kern and Kings rivers a great many lakes, too, have been reached and planted with adult golden trout. Following the original plan, other lakes of the summit region are now being reached as fast as possible and stocked with none but golden trout. The close of the season 1914 will mark the extension of the range of the golden trout northward from their original habitat in the Mount Whitney region more than 100 miles. Cut off by high falls from the lower waters where other varieties of trout have been planted, the golden trout now being established in the summit region will remain true to their type, since no opportunity will be afforded for interbreeding with other varieties. For future reference, it is here recorded that in these golden trout operations only the golden trout of Volcano Creek, *Salmo roosevelti* (Evermann) are being used as stock fish. Two other varieties of golden trout, to wit, the *Salmo agua bonita* (Jordan) and *Salmo whitei* (Evermann) are recognized by the authorities, but lest confusion should arise in identifying these transplanted fish in future years, only the Volcano Creek fish are used in the commission's operations.

The details of the fish planting operations of the Fresno office during the season 1913, are set forth in the following copy of a report filed at the close of the season. This report deals only with the planting of barren waters by the Fresno office of the Fish and Game Commission. Several hundred thousand trout fry were distributed to public spirited applicants throughout the Fresno Division, to be used in replenishing the supply of trout in the more accessible, and consquently over fished streams.

Fish Planting Report, 1913.

FISH AND GAME COMMISSION,
San Francisco, California.

GENTLEMEN: I have the honor to report the season's fish planting operations of this division, as follows:

In the month of August (16th to 29th), Deputy W. G. Scott of Tuolumne County, assisted by William Guinn, with seven pack animals, undertook, and carried on to a successful conclusion the stocking of some important lakes in the mountains of

Tuolumne County. Adult stock fish of the rainbow trout variety were used in Deputy Scott's operations. Deputy Scott was compelled to take his supply of stock fish with hook and line. Fishing with "flies," the deputy and his assistant first took 250 rainbow trout ranging from eight to twelve inches in length, from the stream at Lord's Meadow near the Yosemite National Park line, and thereafter planted them in Deer Lake and in Big Lake above Piute Meadows. These lakes, which are about fifteen miles from Strawberry station, are of large size and excellent spawning water is afforded by a stream which flows through both lakes.

In accordance with a mutual understanding between Major William T. Littebrant, Acting Superintendent of Yosemite National Park, and this office, whereby, at Major Littebrant's request, we agreed to do some trout planting in the back waters of Yosemite National Park, Deputy Scott next transferred his operations to the vicinity of Wilmer Lake within the park boundary. Major Littebrant showed the party many courtesies, which are hereby acknowledged. Taking adult rainbow trout for stock fish, as before, Deputy Scott stocked Dorothy Lake at the head of Jack Main's Canyon, and Mary Lake, some five miles above Tilden Lake, stocked last season; both within the park boundary. Dorothy Lake and the stream in Jack Main's Canyon promise to be some of the best fishing waters within a large section of the Sierra Nevada Mountains. Deputy Scott was greatly hampered in his operations by reason of many severe electric storms. The deputy was himself, once shocked into unconsciousness by lightning which struck a tree near where he was working while taking up fish. He was alone at the time, and has no idea of the length of time he was unconscious, but believes it was for a considerable period, since all of the fish in a can which he was carrying were dead when he recovered consciousness. Added to the fish planting work previously reported in former years, the Tuolumne County section of the mountains will soon afford splendid fishing opportunities for the constantly increasing number of people who seek that section as an "outing" ground. There remains to be stocked, some back waters, both lakes and streams, which waters we have reserved to be planted with golden trout, in accordance with the established policy of this division.

* * *

Our packhorse distribution fish work having been confined, in 1912, to stocking the barren waters of the mountains of Madera and Tuolumne counties, and the work of distributing rainbow, Lock Leven and Eastern brook trout being well advanced throughout the division, the major effort in fish planting work this year was devoted to transplanting golden trout to suitable waters in the mountains of Tulare and Fresno counties. Accordingly, on July 30th, Deputies S. L. N. Ellis and E. W. Smalley left Big Meadows in the mountains of northern Tulare County, with a splendidly equipped pack train, to carry forward the programmed transplanting operations in the watershed of the upper Kern River. En route, they stocked Moose Lake with Lock Leven and Eastern brook trout taken from Weaver and Jennie Ellis lakes, which lakes were stocked by this office with Lock Leven and Eastern brook fry in 1911. Both varieties have thrived in the two lakes mentioned to such a degree that a supply of stock fish was readily secured by the use of "flies." The Lock Leven trout used for planting Moose Lake were about eight inches in length while the Eastern brook trout ran about thirteen inches in length. Moose Lake is locally famous as the largest sheet of water in the Kaweah watershed. It lies an easy day's travel from Giant Forest, at an elevation of some 11,500 feet, and has heretofore, like most other lakes in these mountains, been barren of any fish life.

Proceeding to the upper Kern watershed, the deputies took up adult stock fish from available sources and made thirty-four distinct plants of golden trout in barren waters; principally lakes. Since most of these lakes, and the smaller streams, are as yet unnamed, the waters planted can best be described in general terms, as that section of the Kern River watershed lying west of the Whitney Divide and drained by the North Fork of Volcano Creek, Whitney Creek, Crabtree Creek and the two branches of the East Fork of Kern River.

Deputy Ellis reports that he investigated those waters in the Kern River region which were planted with golden trout by him in 1909 and 1910, and that with two exceptions he invariably found that these plants have been completely successful. These transplanted golden trout have lost none of their original color and markings, and like other varieties of transplanted trout, average larger in size than the original stock.

The transplanted fish seem, in every instance, to have sought out the comparatively quiet waters of open gentle riffles, and are not found in large numbers in extremely rough water or in deep pools below falls and cataracts.

In giving the golden trout this wide distribution, we are but barely anticipating the drain which will be put upon the supply of these incomparable fish by reason of the constantly growing influx of campers and tourists who will annually visit the upper Kern River region. Kern River and the whole Mt. Whitney region, for many years past the summer "outing" grounds for large numbers of people from the San Joaquin Valley, is fast becoming the goal of an army of pleasure seekers from south of Tehachapi. Many automobile parties from southern California reach the region via Kernville and thence by pack train to the various favorable objective points. Many people, too, find their way into the region via Lone Pine and Independence, which are easily accessible by railroad from southern California. From Lone Pine or Independence it is but a short trip with a pack train into the upper Kern River Basin.

On September 1st the deputies left Whitney Meadows with 821 golden trout (*Salmo roosevelti*) with which to stock some selected waters in the Roaring River watershed tributary to the South Fork of Kings River. These stock fish were from three to eight inches in length, and were secured principally by turning a stream, at Whitney Meadows and taking them up in the manner described in previous reports. The expedition had been constantly hampered by terrific storms which prevailed throughout the Sierra Nevada Mountains during all of last summer. Heavy rains spelled muddy, swollen streams and constant difficulty in securing supplies of stock fish. On the return journey the expedition was compelled to travel by a circuitous route because of washed out trails. As an example of the possibilities of packhorse fish distribution in the high mountains, I would state that to reach Roaring River from Whitney Meadows involved descending into the Kern River Canyon, crossing the Kern-Kaweah Divide, thence to Mineral King and on through Timber Gap to the Kaweah Canyon; thence over the Kaweah-Kings Divide and on to Roaring River, a matter of some six days steady travel. Of this lot of 821 golden trout, some fish, when planted, had been in the cans for fourteen days. The total loss from the time of the start from Whitney Meadows until the last fish was planted, amounted to five fish.

On September 4th, Deputy F. A. Bullard relieved Deputy Smalley and thereafter assisted in the distribution of the Roaring River consignment. Thirty-one plants of golden trout were made in barren streams and lakes tributary to Roaring River. A survey of the region enables me to confidently predict that these waters will prove thoroughly adaptable to the golden trout, and that they will become well established throughout the section.

While on the subject of golden trout, I have to report that in July of this year I personally investigated a small plant made by Deputy Bullard in 1911, in the waters of a small creek at Traweeks some six miles east of Dunlap, in Fresno County. This stream lies at an elevation of about 3,500 feet. Its waters, because of the comparatively low elevation, become quite warm during the summer months, reaching a temperature of about seventy-five degrees. On account of the small volume of water and high temperatures, I had never planted trout of any variety therein, believing the stream to be incapable of supporting trout life. Certainly the conditions present a severe test of the adaptability of golden trout to waters in regions other than their native habitat. I found golden trout of various sizes in considerable numbers in this creek. A specimen some twelve inches in length, I judged to be one of the original plant. I found that while the fish were not so brilliantly colored as the fish of Volcano Creek, they were nevertheless very pronouncedly golden trout. I attribute their somewhat duller coloring to the fact that they are now found in shady pools and in water frequently discolored by decaying leaves and from vegetation. Incidentally I would state that Deputy Ellis reports a peculiar phenomenon in connection with these particular fish. In taking them up for transplanting, a few were accidentally killed. Immediately after their death, and for several minutes, these specimens suddenly glowed with all the brilliancy and peculiarities of color of the original Volcano Creek golden trout. As a further experiment, Deputies Ellis and Bullard, at my direction, took up a number of the golden trout from Traweek Creek and carried them back to a branch of Sugarloaf Creek in the Roaring River watershed and absolutely beyond any possibility of other fish ever becoming mixed with them. The waters selected, while far remote from the Whitney region, are like, by reason of altitude and temperatures, other waters wherein we have successfully established transplanted golden trout. Should these twice transplanted fish regain their original brilliant coloring, it would go far toward confirming the belief of those who hold that golden trout are a distinct species.

After completing their golden trout work, the deputies took up six cans of two year old Eastern brook trout from Jennie Ellis Lake at the head of Boulder Creek, and carried them, a three days' journey, to a large barren lake in Granite Basin, on the divide between Middle and South forks of Kings River.

The time consumed in the various activities of this expedition was sixty days, exclusive of the time required to go and come from the mountains.

* * *

In addition to the packhorse distribution work, several hundred cans of trout fry from the Sisson hatchery were distributed to public waters throughout this division. Since such plants are a part of the hatchery department records, they will not be specified in this report. Two enterprises, however, are worthy of particular note. In the month of September, 40,000 Loch Leven fry were planted in Lake Huntington. This body of water, some five miles long by one half mile wide, is a new reservoir at the head of the Pacific Light and Power Company's pipe line in eastern Fresno County. Acessible by the San Joaquin and Eastern Railroad, this lake must, in the future, be heavily drawn upon by many people in search of fishing.

At Shaver Lake, also in Fresno County, a departure was made this season from the usual policy of stocking mountain waters with no fish but trout, when we planted therein some 300 adult black bass. The stock fish were secured in the course of our bass rescue operations in Kings County, and were of various sizes, from one half pound to four pounds in weight. Shaver Lake, while fairly well adapted to trout life, will no doubt prove to be most excellent bass waters; and since Big Creek Lake and the nearby streams will be kept strictly trout water, Shaver Lake will eventually offer a pleasing variety in the sport to be enjoyed in that section of the mountains. The popularity of lake fishing for bass is attested by the number of people who annually visit the Crane Valley reservoir on the north side of the San Joaquin River.

The fish planting operations of the Fresno office during the season 1914 will be on a much larger scale than ever before undertaken by this office. It having been demonstrated that more fish could be carried in tin cans than in galvanized ones, tin was substituted for galvanized iron in the construction of pack horse fish cans some three years ago. Experiments in the mean time having demonstrated that canvas containers offer added advantage over tin in the carrying of trout, a new pack horse fish "can" has been evolved by deputies of the Fresno office, which apparently is the acme of perfection in fish carrying receptacles in regions where ice is unavailable and where aeration must be obtained without the aid of artificial methods. The size and shape (oblong) of the usual packhorse can has been retained. The tops and bottoms of the new

Crane Valley reservoir (Madera Co.). Stocked with trout and black bass.

Cascade in Bear Creek (Fresno Co.). Stream stocked with Golden trout in 1914.

containers are of pine five eighths of an inch thick; a throat of tin is inserted in the top, provided with a removable screen as in former cans. A strip of canvas of special design, eighteen inches wide, the ends lapped and sewed in such manner as to make an open envelope, is fitted to the wooden top and bottom and secured thereto by means of clothesline wire drawn in such manner as to press the canvas tightly into grooves which encircle the boards. To give rigidity to this container, a galvanized iron shield is provided with hangers which, when bolted top and bottom to the "can," makes it to all intents and purposes as rigid as though the whole container were of metal. This shield does not completely encircle the can, covering only the back and ends, and to it are attached straps for hanging the container to the packsaddle. For packhorse work the new device has many advantages. First, just enough water exudes through the canvas to keep down the temperature within the container by evaporation; second, aeration of the water is infinitely better; third, the fish are not liable to injury by striking against canvas; fourth, the cans may be carried "knocked down," and set up at any time without the use of tools; one packhorse can carry a dozen or more of these "knocked down" containers, leaving the rest of the packtrain free to carry barley and other necessary supplies for the expedition. A few extra canvas envelopes, which occupy little space, can be carried for emergency repairs, and in event of an accident to a can on the trail a new canvas form substituted for the injured one. To avoid infection, the canvas envelope may, at any time, be removed and placed in boiling water. The cost of this new type of packhorse can is 50 per cent less than for a well constructed tin can. The details of the new fish carrying device were worked out and 14 pairs of the "cans" were constructed by Deputy D. H. Hoen of the Fresno Division.

Game Conditions in the Fresno Division.

WATERFOWL.

The seasons 1912 and 1913 witnessed a noticeable decrease in the numbers of ducks, geese and shore birds throughout the whole length of the former feeding grounds of these waterfowl. Unquestionably, the inroads of the market hunters are fast depleting the supply of these valuable game birds in a region where, in former years, their numbers seemed to be inexhaustible. Eliminating those sections of the valley where the increase of human population has driven the wildfowl from their former haunts, there remains a natural feeding ground in the Fresno Division, extending from the Stanislaus County line through the trough of the valley to Buena Vista Lake in Kern County, a strip of country from 3 to 10 miles wide and 120 miles long. The numbers of waterfowl which twenty years ago annually visited this region and remained during the winter months is simply inconceivable and although the supply of ducks and geese has been diminished by fully 80 per cent, this region still continues to be the source of supply of the major portion of the waterfowl which reach the markets of the big cities. Once the supply of any kind of wild game shows signs of decreasing, the annual decrease in numbers seems like an arithmetical progression. The diminution in numbers of waterfowl in the Fresno Division during the past five years has been far greater than in the preceding twenty years.

While the general situation is alarming, a new and hopeful element has been introduced in the cutting down of spring shooting through the federal migratory bird law. With the stoppage of shooting after January 31st, large numbers of ducks, being unmolested during the month of February, remained and nested in the swamp lands of the trough of the valley. Most gratifying reports of nesting ducks come from many points throughout the overflowed section of the valley. The wisdom of stopping the shooting of ducks through the month of February has been demonstrated beyond the possibility of doubt. Nor will the loss of February shooting to the sportsmen be without its compensation, for these homebred birds will afford fall shooting, which in late years has been a negligible factor in the season's sporting possibilities.

QUAIL.

In the Fresno Division as a whole the supply of valley quail has materially decreased during the past two years. The chief untoward factor which has brought about this condition was the two successive dry seasons, 1912 and 1913. It is a well recognized fact that quail do not breed to any considerable extent in dry seasons. There being no perceptible increase in the fall over the number of quail left at the close of the preceding spring, very naturally the coveys of what should be stock birds suffered materially at the hands of the gunners. The hatch of quail in the early summer of 1914 has, however, been most gratifying, and it is possible that by rigid regulations the general supply of quail may be restored in a few years. Speaking particularly of that section from Coalinga southward, and in the hills and valleys of the Coast Range Mountains, which are the western boundary of the San Joaquin Valley, the old-time conditions can never be fully restored. Up to the time of the discovery of oil, these hills were an isolated and seldom visited region. Quail in vast numbers were found in every canyon and valley. In the Cuyama Valley, in Kern County, five years ago the ground was literally covered with them. The development of the oil industry caused many towns of considerable size to spring up in what had formerly been a desert region, and right at the edge of the quail country. The presence of such vast numbers of quail was a direct invitation to hundreds of gunners and the unsophisticated birds fell easy prey even to tyros. The resulting condition throughout this section is now about on par with that of other parts of the division, and here, as elsewhere, it is apparent that the open season should be shortened and the daily bag limit reduced. There should also be a weekly as well as daily limit of birds which one person may take.

DOVES.

Except in the counties of Tuolumne and Mariposa, the general supply of doves throughout the Fresno Division apparently is well maintained. In spite of the fact that doves are the most generally sought of all the game birds in the Fresno Division, the restriction of dove shooting except during September and October seems to have proven adequate to insure the presence of large numbers of doves for many years. Although the general game law for many years permitted the shooting of doves after July first, several counties of the valley section prohibited, by county ordinances, the shooting of doves until September first. The effect was to add to the general supply a second brood of young doves. The legislature in 1911, in response to a general demand, forbade by law the shooting of doves in the Fourth Fish and Game District until September first. The wisdom of this action is evidenced by the fact that doves may now be found throughout the whole Fourth District in probably as great numbers as at any time during the past ten years. While the ethics of shooting doves under any circumstances may be debatable, the fact remains that throughout the Fourth District dove shooting is the most nearly universal sport of the gunners, and that the supply has been maintained by wise restrictive laws, the number of doves annually killed must be enormous. In the season of 1913, it is estimated that in Fresno County 4,000 gunners were out for doves on the opening day, September first; and it is a tribute to the existing game laws that few if any of these people were disappointed in the day's bag. After the opening date doves could not be so readily secured. Apparently the surviving birds took refuge in the Sierra hills and in isolated sections of the sparsely inhabited west side of the valley. The spring of 1914, however, disclosed the presence of doves in their old breeding grounds in most satisfactory numbers.

MOUNTAIN QUAIL AND GROUSE.

The annual supply of mountain quail and grouse in the mountains of the Fresno Division apparently depends principally upon weather conditions during the nesting season. Except in the counties of Tuolumne and Mariposa, very few mountain quail and grouse, comparatively speaking, are killed by hunters. Except in the counties named, there is sparse population in the sections where mountain quail are ordinarily found. The range of the grouse is at even higher altitudes. Most people, when in the higher mountains, carry rifles only; hence, their opportunity for killing mountain quail and grouse is a comparatively negligible factor in the situation. Should the opening of the deer season in the Fourth District be made to conform to the season in the Third District, the number of shotguns which would be found in the possession of "outing" parties in the mountains during September would be small indeed, and since weather conditions close the higher mountains to "outing" parties after October, the only mountain quail which would be killed thereafter would be the few which annually migrate down to the hills along the edge of the snowline. Up to this time, the chief source of destruction of mountain quail is undoubtedly bobcats and other natural enemies of the quail.

DEER.

Taken as a whole, the supply of deer in the Fresno Division is about normal. In some sections in both the Sierra Nevadas and the Coast Range Mountains the deer have actually increased, while in other sections there is a noticeable decrease. In Tuolumne and Mariposa counties the situation is satisfactory. In the mountains of Madera County the deer appear to be more than holding their own. In Kern County the situation is satisfactory. There is, however, a decrease in the supply in the mountains of Fresno County, and this condition is very noticeable in some sections of the mountains of Tulare County. The legal season for killing deer in the Fourth District is calculated to benefit neither the deer nor the shooters, and should be changed. The open months for the shooting of deer are now July and August, and while it is an undoubted fact that bucks are not in good condition for human consumption during these months, particularly during July, yet, at this time, they are more easily found and killed. As the law now stands, it is a crime to kill bucks during September and October in the Sierra Nevada Mountains of the Fourth District when, as a matter of fact, they are then in prime condition and infinitely better able to protect themselves from slaughter than during July and August. It may be safely stated that the universal opinion of those who are best informed is that by all means the open season for deer in the Sierra Nevadas should include the months of September and October instead of July and August as at present. There is no good reason why the Sierra Nevada Mountains of the Fourth District should have an earlier deer season than prevails in the mountains of the Third District, since conditions are practically the same throughout the Sierra Nevadas. If there is a difference, from a biological standpoint, it is in favor of a later deer season in the Sierra Nevada Mountains of the Fourth District than that of the third. From the standpoint of game conservation there is everything in favor of a late open season for deer shooting in the Sierra Nevadas. In September and October they would be successfully killed principally by hunters of some experience, and thus few, if any, immature males and practically no does would be killed through excitement on the part of the hunter. The people who live in the mountains and who now resent the workings of a law which permits the shooting of deer at a time when they are not in prime condition, would be inclined to take personal interest in the protection of deer during the closed season. Aside from all this, it is an economic waste to kill game of any kind when it is not in prime condition.

By an act of the legislature of 1913, that portion of the Coast Range Mountains which was formerly included in the Fourth District, was placed in the Fifth Fish and Game District in order to permit of an earlier open deer season than that which was to be provided for the Fourth District. While there is no question but the deer of the Coast Range hills mature earlier than the deer of the Sierra Nevadas, at the same time July first is too early to shoot deer on the eastern slope of the Coast Range. Considering the comparative accessibility of the Coast Range Mountains, which makes for the easy destruction of deer during the open season, the open season is now too long in those mountains. A single open month, August, would probably be a more rational deer season in the Coast Range. An open season from July fifteenth to September first would be an improvement over present conditions. The development of the oil fields in Fresno and Kern counties, along the edge of the Coast Range hills, has had a decided effect in depleting the deer supply of the Coast Range in those counties. Climatic conditions, however, in the Coast Range, are very favorable to the existence of deer, and with proper conservation a reasonable supply can be maintained for many years.

BEAR, ELK, ANTELOPE, AND MOUNTAIN SHEEP.

Of late years there has been a very noticeable decrease in the number of bear found in the Sierra Nevada Mountains. Once classed as ''varmints,'' whose destruction was the hope of all mountaineers, bear have come to be an object of solicitude on the part of many thoughtful people who live in and near the mountains, and who formerly could see no good in them. As an object of pleasurable pursuit, many people would see the remaining supply conserved; and many people, too, regret the disappearance of any form of wild life. Most of the bear which are now killed are taken during the summer months, principally by means of traps and setguns, at a time when the meat and hide is absolutely worthless. There is a growing sentiment in favor of protecting, by law, the bear of the Fresno Division during the summer months.

Few people know that there are still to be found, in the so-called west side region of Fresno and Kern counties, a few scattering bands of antelope. While their number can never increase to the point where they may be classed as available game animals, yet the few remaining bands are holding their own in numbers, and since their range is in a section where the population must be sparse for a great many years, there need be no immediate alarm over their possible extinction. In time, steps must be taken to impound, in some suitable locality, the remnant of the vast herds of these very interesting animals which once roamed at will the whole San Joaquin Valley, lest one more species of wild life be lost to the world.

In Kern County is to be found the last remnant of the formerly vast numbers of dwarf or tule elk which once inhabited the San Joaquin Valley. These elk are a distinct species, and were never found naturally in the higher mountains. At certain seasons they did inhabit the Coast Range hills, but there is no evidence of elk ever being seen at considerable altitudes in the Sierra Nevadas. It has been recorded in a previous biennial report that the elk of the valley at one time had been reduced to a single pair, which Mr. Henry Miller, of the Miller & Lux corporation, took under his immediate protection on the Button Willow ranch in Kern County, and from this pair the number has increased to about 500 specimens. They now range on the ranches of the Miller & Lux corporation and the Kern County Land Company, all in Kern County. A serious and aggravating problem is now presented as to how to conserve and perpetuate these remaining elk. Roaming at will over the Miller & Lux properties, the elk cause great destruction of grain crops, estimated by Mr. Miller at $5,000 per year. It is a tribute to Mr. Miller that he has borne patiently their depredations these many years, but the time has come when something must be done to impound the elk at public cost. Various schemes for splitting the elk herd into small bunches and removing them to other localities have been advanced, but here arises another complication, best illustrated by an instance where such a plan has already been tried. A number of years ago some twenty-six elk were taken to Sequoia National Park in the mountains of Tulare County. The enterprise was accomplished only after great exertion on the part of those having the matter in charge, and with considerable suffering and mortality among the elk. The federal government fenced a large enclosure within the park, in which to hold the elk, and for a period of years the scheme seemed to work satisfactorily. At the present time, according to the estimate of Mr. Walter Fry, Acting Superintendent of Sequoia National Park, the original twenty-six head which survived transportation have increased to about fifty. Some of these elk of late years have refused to stay within the enclosure provided for them, and because of the rugged nature of the park, it is apparently impossible to so construct a fence as to prevent their escape. Considerable damage has already been done by wandering elk, to fences and young orchards in the Three Rivers section. It is easily conceivable that if the Kern County herd of elk should be divided and released in small bunches in other sections of the state, much cause for complaint of depredations by escaping elk might arise in those other sections. As suggested by Dr. Grinnell of the University of California, apparently the most satisfactory and feasible solution of the situation would be for the state to secure a section or two of land in the territory which is now the natural range of the elk, and there impound and care for all of the present herd or at least a sufficient number to perpetuate the species. Such a plan would involve considerable expense for the purchasing of land, since it would not suffice to place the elk upon arid lands where feed conditions are uncertain. To provide the best natural condition for the elk would involve the securing of 500 to 1,000 acres of good land out of the Miller ranches along Bull Slough in such location as to permit of enclosing also a large body of government land in the Elk hills which adjoin the tract. Under natural conditions the females of the species sought out the dry arroyos of these hills during the gestation period, and while these lands would not afford sufficient feed to maintain the herds throughout the year, it would be wise to include them in the general scheme of providing a park for the elk. The acreage of good land could be planted to alfalfa, and being already well watered, would provide ample food at all times of the year for the elk. On these lands there would be no difficulty in constructing a fence sufficient to impound the herd.

There still remains a few mountain sheep in the high mountains of the division. A bunch of over twenty was seen last summer near the head of Silver Creek in the summit region of eastern Fresno County. A small band probably still ranges in the inaccessible mountains about the Palisades at the head of the Middle Fork of Kings River. There is no record and no rumors of any unlawful killing of mountain sheep in the division during the past two years.

PRIVATE PRESERVES AND THE GAME LAWS.

By ERNEST SCHAEFFLE.

Dissatisfaction over the control and use of wild game is probably as widespread in the United States as it ever was in Europe, where we point whenever we want to show a horrible example of selfishness and injustice to the masses.

And, misunderstanding, as to the real trouble, is apparently as widespread as the dissatisfaction. No two people seem able to agree as to the cause of the universal complaint, the blame being usually placed upon the "game laws." Was ever an institution or programme so generally misunderstood as those compromise statutes, usually ineffective, intended to preserve the country's wild life!

The writer of this article makes no claim to wisdom; but a peculiarly intimate acquaintance of many years with game and fish, "game laws," so-called "poachers" and the general public has given him some knowledge of natural conditions and those unnatural conditions brought about by advancing civilization, and he feels capable of explaining and clearing up some of the existing dissatisfaction and misunderstanding.

We must recognize the fact that in the United States, and in most foreign countries, land is subject to private ownership. Of course in every country large areas are collectively owned, or owned by the "government," the "crown" or by free cities and by states; but, with the possible exception of Russia, the private holding system obtains and is pretty generally regarded as being just and wise. We have the system in this country as an inheritance from our British predecessors in occupancy, who, in turn, had it from the Romans.

Along with the private land ownership system, however, has gone a somewhat conflicting system of public ownership in wild game and fish. That conflict should arise as a result of the dual system was inevitable; but that much of the present day discontent comes from it may not have occurred even to careful students. Let us state the case concretely, and see if it does not immediately become clearer and more convincing.

About ten per cent (more or less) of the population owns the land that is not publicly owned. The remaining ninety per cent owns no land and has no rights to or upon any "land" except public waters and highways, public parks, reservations, etc.

The wild life belongs to the "people," by which we always mean the hundred per cent, whether they own land or not.

Now, the ninety per cent, being people—the same as the ten per cent—like to ramble about on holidays and Sundays and to hunt and fish.

But—and right here the trouble begins—the minority owns the farms and the streams and lake beds and borders, and quite naturally objects to trespassing and keeps or puts the invaders out.

All the while, mind you, the game and fish belongs to the general public, and the general public knows it and curses a system of laws that keeps it away from them and in the practical possession of the landholder.

The fact that a tract of land is used by a "gun club" or "preserve," whether by virtue of ownership or mere lease, is invariably sufficient to irritate the local public. For some reason the prejudice against a farmer who closes his place against public hunting is nothing compared to the ill feeling entertained for a club (or even an individual) who keeps a place as a "preserve." It seems also that, mingled with resentment at being denied a privilege, is to be found a rapidly growing belief that the public has a right to go on private land so long as the purpose is the pursuit and taking of "community property," and so long as no actual damage is done to the landholder's own possessions.

In the marsh at the head of Newport Bay.

It is, of course, outside the purpose of this article to discuss the questions of land ownership and trespass; but no argument over the ownership of game and the public rights in it can be engaged in without going smash against those questions. And, what is more disquieting, it seems certain that the present trouble between the hunters and fishermen and those who control the game and fish will continue and increase. What the outcome will be no one can foresee; but it is hard to even imagine that a people wedded to the idea of private ownership in land and in the unrestricted use of it, as well as to the idea of a divine right to protection in such ownership and use, would stand for the general "trespass" that would be needed to bring about the end desired by the public.

That private ownership means careful and often complete protection to wild species is not always accepted by the public as sufficient excuse for the system. Too often sentiment seems to favor utter extinction of what can not be freely and universally enjoyed. This sentiment is, possibly, weak and hysterical, besides being a menace to animals that have the same right to existence and comfort that man himself claims.

The future may prove the viciousness of such feeling by developing some different scheme of holding land, under which every one will have real ownership in such wild life as may be spared by the present ruthless generation. I say present generation advisedly, for it is evident that another twenty-five years will see the practical extermination of every desirable wild species in North America, unless the present slaughter is checked. Some doubting Thomas may say, "That can't be true, for in Great Britain, with her forty-five millions of people, they have been slaughtering for centuries, and still there's plenty of game." Another doubter will say, "Why, just establish public game preserves, like those they have in Oklahoma, and everybody can have game." And even another will say, "All they (note the they) need to do is to start farms everywhere and raise pheasants and wild ducks and deer, etc." Just for fun I am going to show the fallacy of all three arguments—partly because they're all fallacious and dangerous, but largely because they have been given wide circulation by irresponsible and dishonest agencies and are accepted, more or less, by the public.

The first argument is advanced by superficial thinkers. It is true that there is still wild game in Great Britain; but it exists because millions and millions of pounds are spent each year by sportsmen and landholders in fencing and draining, building of roads, trails and telephone lines; in the wholesale poisoning and trapping of predatory birds and animals; in the rearing, liberating and "training" of millions of birds; in the feeding, watering, sheltering and even doctoring of wild deer, grouse and partridges, and in the continuous patrol against "poachers" by a body of "keepers" nearly as large as the regular army of the United States.

Further than this, the kill of game in Great Britain is not to be gauged by either area or population, for out of forty-five millions of people, less than sixty-eight thousand do all the hunting, and the number is decreasing. There are now over one hundred and sixty thousand hunters in California and the number is increasing by leaps and bounds.

As to argument number two—that about public preserves. We have them—have had them for years—and will have more and larger ones. But if the entire state were one preserve it would not raise the game that the public wants. Furthermore, not all varieties would breed in the state; most species of wildfowl breed only in more northern latitudes. What we must realize is that game must be treated like any other crop, saving each year enough seed for the next season's planting, with something over as a safeguard against bad weather, epidemics, etc.

And now we come to the last argument, which, of the three, sounds the best to many enthusiasts. The answer is that the game farms and preserves cost money, even in England, where families have owned the same tract of land until its value has been forgotten or is no longer appreciated, and where labor is dirt cheap. I have been told (by one of them) that capable gamekeepers work in England for $6.00 a month "and found." The same man would demand from $40.00 to $60.00 a month here and would refuse to work as hard or as long. But the great trouble is that successful game preserves and farms are almost an impossibility because of the public's determination to pursue and kill "wild" game, even on private holdings. It is true that every hunter does not "poach" and it is also true that some preserve owners are able to protect their property; but a great many hunters will hunt wherever the shooting is good, and the average farmer or preserve owner gets laughed out of court whenever he attempt the prosecution of a trespasser. Some preserve owners have given up the courts and rely upon the shotgun, which is a favorite plan in Europe. Obviously the plan fails here, and what is worse, carries the whole scheme of things into increasing disrepute.

And now, lest the reader quit with the feeling that the situation is utterly hopeless, I will venture—a prophecy, shall we call it? It is my strong belief, based upon the knowledge gained through experience and investigation, that the American public at last realizes the value of wild life and the terrible necessity of protecting the pitiful remnant left. I believe also, that we will, if we find that the tinkering of the past and of the present has resulted in nothing but a sense of false security, and if compromise measures are not soon found, close down on all killing, whether for commerce or for sport.

DEPARTMENT REPORTS.

REPORT OF LEGAL DEPARTMENT.

BY R. D. DUKE.

Fish and Game Commission of the State of California:

GENTLEMEN: I herewith transmit to you a report of the work of the legal department of the commission, for the two years ending June 30, 1914.

Among the more important cases tried by this department for this commission are the following:

In 1909, the board leased about forty-one acres of land near Hayward, in Alameda County, as a game farm, for a period of one year, at $37.50 per month, with option to renew the lease for nine years provided written notice of intention to accept said option were served upon the lessors. During the first year, improvements amounting to about $12,000 had been placed on the land by the Fish and Game Commission; but no written notice as stipulated in the lease was served on the lessors. At the expiration of the term of lease, the lessors began an action for the possession of the property and $2,000 a year rent from and after the expiration of the first year's lease. The court decided that the lessors had waived written notice and instructed them to enter into a lease with the commission for the full term of nine years, upon payment of the original rental stipulated in the lease, which was accordingly done.

For a number of years prior to 1913, there was an organized effort on the part of certain commission merchants in San Francisco to evade the limit law on ducks and to that end transfer companies were formed, which, while endeavoring to act as such, were, in fact, subterfuges of the several commission houses; for the reason that a transfer company is allowed to have in its possession more than the limit of ducks in one day, for the purpose of transportation only. When the commission discovered this fact, all the ducks in the possession of the so-called transfer companies were seized. Thereafter, an action was brought in the superior court to restrain the commission from seizing the ducks, so shipped, and for $5,000 damages. Judgment was rendered in favor of the commission and against the plaintiff, for costs. Since the rendering of this decree, these so-called transfer companies have entirely gone out of business and it has reduced the unlawful distribution of ducks to less than one half.

On March 10, 1913, Special Deputy John W. Galloway placed under arrest Herbert Le Cornec, George Le Cornec and J. W. McNamara, for having in possession steelhead trout, which had been taken with an unlawful net. Galloway turned to speak to McNamara, and while his back was turned to the Le Cornec brothers he was shot through the head by Herbert Le Cornec, and the Le Cornec brothers immediately fled. Deputy Galloway drew his revolver and shot both the Le Cornec brothers. Deputy Galloway and Herbert Le Cornec recovered, but George Le Cornec died as a result of his injury. Herbert Le Cornec was brought to trial for assault to murder and the jury disagreed. After a second trial, verdict "not guilty" was rendered.

On April 26, 1913, Regular Deputy Frank P. Cady and Special Deputy Joseph Nelligan arrested ten Indians for spearing spawning trout on streams running into Tule Lake, Lassen County. Three of the Indians, Wilson Duke, John Hendricks and John Pede, resisted arrest, disarmed Deputy Cady and shot Deputy Nelligan three times and then shot Deputy Cady, severely injuring both. Deputy Nelligan then shot Wilson Duke through the chest. The Indians fled with Wilson Duke and left Cady and Nelligan, believing they were dead. Later, on the same day, Cady and Nelligan were found in a shed near the scene of the shooting. Pede and Hendricks were subsequently placed under arrest and tried on a charge of assault to murder, and the jury found them guilty as charged. Wilson Duke was found guilty of assault with a deadly weapon and pleaded guilty to a second charge of assault with a deadly weapon on Deputy Nelligan, and was sentenced to four years in the state prison at San Quentin, and Pede and Hendricks were each sentenced to three years.

On February 2, 1913, Special Deputy Bert Blanchard was murdered by being shot by two men believed to be Italians, in Contra Costa County. The murderers have never been apprehended.

On the 16th day of April, 1913, near San Quentin Point, Marin County, Deputy M. S. Clark and Special Deputy Ernest Raynaud placed Antone Balesteri and Salvatore Balesteri under arrest for catching striped bass with an unlawful net. Carlo Balesteri requested to be taken into the boat, as an interpreter. After Balesteri had spoken a few words in Italian to the men under arrest, a desperate struggle ensued, during which both Deputy Raynaud and Salvatore Balesteri were killed. Deputy Clark was struck and thrown overboard and an attempt made to run him down, but he was rescued by a Joseph Swack. Antone Balesteri escaped and has never been apprehended. Carlo Balesteri was tried and convicted of murder in the first degree, and sentenced to San Quentin Prison for life.

The conduct of all these deputies, under such trying circumstances, in offering and giving up their lives, in the discharge of their duties, can not be too highly commended.

On March 14, 1914, one A. Parra was arrested for fishing without first obtaining a license therefor. This arrest was made for the purpose of testing the validity of the Market Fisherman's License Act, passed in 1913. A writ of habeas corpus was applied for in the District Court of Appeals of the State of California, in and for the Third District, and a writ was denied. Another writ was later taken to the Supreme Court, which, by also denying the writ, has affirmed the decision of the District Court of Appeals. This determined the constitutionality of the Market Fisherman's License Act.

Besides the above cases, this department, during the period beginning July 1, 1912, to and including June 30, 1914, has tried 225 cases throughout the State of California.

In addition to the above cases, this department has been called upon to give many opinions respecting the laws for the protection of fish and game, to various citizens throughout the State of California, and the several departments of this commission; also many hundred letters answering inquiries for information have been written respecting the fish and game laws.

During the legislature of 1913, this department continually engaged in assisting the legislators in drawing the necessary laws and in making amendments with respect to fish and game legislation.

It has been necessary to visit a great many of the power and irrigating companies of this state with reference to the screening of ditches and the placing of fishways in order to prevent the enormous destruction of fish. This work is far advanced and has been accomplished with but few prosecutions.

San Francisco, June 30, 1914.

REPORT OF SUPERINTENDENT OF HATCHERIES.

By W. H. Shebley.

To the Honorable Board of Fish and Game Commissioners of the State of California.

Gentlemen: I herewith present my report for the year 1913, and so much of the work as has been accomplished and under way for the first six months of 1914. The report of the hatchery department for 1913 shows the number of fish distributed by the commission, from which hatchery or hatching station, the number of fish distributed in each stream and the names of the applicants.

The work of distribution for 1914 is now under way, but will not be completed until late in the fall, therefore it will be impossible to give more than the number of trout at the different stations that are now ready for distribution. The salmon work for 1913 and 1914 is given in full, as the eggs taken during the fall of 1912 were distributed in 1913 and the eggs collected during the fall of 1913 were distributed during the spring of 1914.

This department has been busily engaged in the surveys necessary to screen the ditches and canals throughout the state and to plan efficient fishways or ladders over the dams that obstruct the free passage of fish in our streams. Mr. A. E. Doney, as ladder surveyor, and Mr. A. E. Culver, in charge of the screen investigation and surveys, have rendered valuable services in this work.

The preliminary studies of the screens most suitable for the conditions that exist in the different parts of the state were begun in 1912. It was found on examination of the conditions that the parallel bar screen with the automatic cleaning device for the large ditches and canals, and the rotary screen devised by R. W. Requa for the smaller ones, are all that is necessary to save the fish, if properly installed and cared for.

Surveys and plans have been made in nearly every county in the state that required screens and ladders for the preservation of the fish. While there is a great deal more to be done, we have, in our limited time, covered as much of the ground as possible. This work necessarily caused a great deal of correspondence. After the plans were made for fish ladders and screens and the legal notices served on the owners of the ditches, canals, and dams to have the work done, in nearly every instance the owners asked for instructions regarding the detail of the work, and in many cases delays were caused by storms, and the inability to get material to complete the work in the specified time. Extensions were granted in all cases where we were satisfied the persons applying for the same were honestly endeavoring to comply with the plans and carry out the instructions given them.

During 1913 and up to date, July 20th, over four hundred and twenty notices were served on the owners of ditches and canals, and plans furnished. Owing to the limited number of men engaged in the investigation, we have not as yet received full reports on the number of screens installed. To date we have a record of two hundred and thirty-five screens that are in place and working satisfactorily. The work of installing the screens was necessarily slow as the surveyor had to make a great many long trips to inspect the ditches, plan the screens particularly adapted for each ditch, as well as to find the owners of the ditches and serve the legal notice on them, to comply with the law.

The large screens in the canals of the Sacramento and San Joaquin valleys were expensive and required considerable skill and judgment in planning them. The parallel bar type with the self-cleaning attachment is the one that we have planned for all of the larger canals. Among the larger screens installed so far are the screens in the canals of the Sacramento Valley West Side Canal Company, near Hamilton City, Glenn County; the East Side Canal Company, Merced County; Pacific Light and Power Company, Kern County; Mt. Whitney Light and Power Company, Tulare County; Peoples Ditch Company, Kings County; Lower Kings River Canal Company, Kings County; Lemoore Canal and Irrigation Company, Kings County; Empire Water Company, Kings County; and the Sutter-Butte Canal Company, Butte County. The screen of the Sacramento Valley West Side Canal Company was our first attempt at a large parallel bar screen. Quite a number of smaller ones of this type had been installed in other parts of the state, but no attempt had been made to construct one of the proportions necessary to efficiently screen a canal of this size. The canal at the place selected for the screen is seventy feet wide and sixteen feet deep. I called on the president of the company, Mr. W. F. Fowler, in February, 1913, and stated that the Commission desired him to screen the canal, as we had demonstrated to our satisfaction that all the ditches and canals in the state could be screened without working a hardship on the owners, if the proper type of screens were used, according to the location and the amount and kind of debris in the water. He willingly agreed to do so if I could suggest a plan that would meet with the approval of the company's engineer, Mr. H. Cauthard. I suggested the parallel bar type with the self-cleaning attachment. Mr. Cauthard immediately took the matter up with an iron manufacturing company and soon had the material for the screen in place. The automatic cleaner is operated with a small motor and the expense of keeping the screen clean is very small. One month last season the expense did not exceed fifty cents for the electric current to run the motor. The motor is operated at such times as is necessary to clean the screen. On page — of this report is a photograph of this screen.

The fishway or "fish ladder" work, as it is commonly called, has been making good progress, when the time for the making of surveys, plans and blue prints are taken into consideration. Delays were caused by owners in asking for extensions of time, necessary to get the materials to construct the fishways, and the time often asked for the surveyor to return and give the builders further instructions regarding the work of construction. During 1913 and 1914 we have made 118 surveys for ladders over dams. Forty-four fishways have been constructed, repaired and are being built. In addition to the fishways constructed, nine obstructions and dams have been blown out by the owners and the commission, to give an unobstructed passage for the fish in different streams. The more important dams have been looked after first. We have made it our constant care to see that all the ladders that have been built and repaired were kept open for the free passage of fish. We have 41 surveys from which blue prints will be made this summer, and it is our earnest endeavor to get as many of these fishways completed by fall as possible.

Screen of Sacramento Valley West Side Canal Co., in Stony Creek, Glenn County. Seventy feet long and sixteen feet deep.

One important matter relative to fishways should be taken up by the next legislature, and an act passed to compel the owners of fish ladders to allow sufficient water to pass through their fishways at all times to allow the fish a free passage through the ladders as well as to support the fish life below the dams during the minimum flow of water. It is useless to construct fishways if there is not to be sufficient water in the streams below the dams to keep the fish alive during the minimum flow in the summer and fall. I have studied these conditions for a number of years, and I would recommend that 10 per cent of the amount of water in each stream, river or creek, measured half way between the watershed and the mouth of the stream, be allowed to pass over or through every fishway, dam or obstruction that diverts the water from the main channel, to the mouth of the stream. This act should apply to all streams that do not sink or get so low that they do not flow at their mouths in the dry season. We find considerable difficulty in getting the owners of dams and fishways to allow sufficient water to pass their dams and fishways during the period of low water. If 10 per cent of the water, measured, as stated before, half way between the watershed and the mouth of the stream during the minimum flow, be allowed to flow continuously in the bed of the stream there would be sufficient for the fish, and the loss to the power plants and irrigationists would be very small, as nearly all the persons owning or managing such dams can plan to allow this amount of water to flow over the dams or through the fishways without damaging their interests. Where there are several dams on a stream, each one could give up an amount of water proportionate to the amount used at their respective dams. Thus, for instance, a stream running 3,000 inches of water at the time of the minimum flow had five dams on it; the largest one using or diverting 1,000 inches of water could give up 100 inches, or ten per cent, without material damage, and the others in like proportion according to the amount they had appropriated. This would not be necessary on many streams, for in most places there is sufficient water to support the fish, if it is properly regulated and the fish ladders kept open.

In cooperation with the Nevada Fish Commission a survey was made for an efficient fishway over the Derby dam in the state of Nevada. The Derby dam is the property of the United States Reclamation Service and diverts the water from the Truckee River about thirty miles below Reno, Nevada, for a large irrigation project in that state. We made several trips to this dam to study the conditions existing there. Complaints had reached the California Fish and Game Commission that the large trout from Pyramid Lake could not pass this dam when attempting to ascend the Truckee River into California on their annual migrations to their spawning grounds. We found that the Reclamation Service had installed a fishway, but that it was not properly arranged for the passage of large fish. The small trout in limited numbers would ascend the fishway above the dam, but the large spawners would not pass into it, or through it. With the assistance of Hon. Geo. T.

Mills, President of the Nevada Fish Commission, we gathered the necessary information to establish the fact that the large lake trout from Pyramid Lake could not pass the Derby dam. The matter was taken up with the United States Reclamation Service through Congressman J. E. Raker, who used his influence to further our efforts in having a proper fishway installed. The Reclamation Service desired to make changes on the fishway that had been installed, but in the judgment of the California and Nevada Fish Commissions, it would not meet the requirements. In November, 1913, a survey was made by our department assisted by the members of the Nevada Fish Commission, for a new fishway over the Derby dam, which in our judgment will allow the large lake trout to pass up the river, if all the details of the plan are properly carried out. As soon as the plans were approved by the Nevada and California Fish Commissions, they were forwarded to Congressman Raker, who presented them to the Secretary of the Interior and the officers of the Reclamation Service, and we have been assured the fishway will be constructed according to the plan that we prepared, this coming fall. Congressman Raker deserves the thanks of the state for his keen interest and untiring efforts in getting the Reclamation Service to construct the fishway over Derby dam.

Fish-way over Clough Dam in Mill Creek, Tehama County.

Following is a list of surveys which have been made for fish ladders to be installed over dams in California up to July 1, 1914:

Owner	County	Stream	Action
Spring Valley Water Co.	Alameda	Arroyo Bayou Creek	Ladder installed.
Spring Valley Water Co.	Alameda	Alameda Creek	Ladder installed.
Harold Meek	Alameda	San Lorenzo Creek	Ladder installed.
Curtz Cons. Mining Co.	Alpine	Carson River	Plans being made.
Nevada-Hercules Mining Co.	Alpine	Carson River	Plans being made.
Sutter-Butte Canal Co.	Butte	Feather River	Ladder installed.
K. Johnson	El Dorado	Trout Creek	Plans being made.
Western States Gas and Electric Co.	El Dorado	South Fork American River	Ladder installed.
K. Johnson	El Dorado	Cold Creek	Plans being made.
Fresno Canal and Irrigation Co.	Fresno	North Fork Kings River	Ladder installed.
U. S. Government	Glenn	Stony Creek	Ladder under construction.
Redwood Mill and Lumber Co.	Humboldt	Little River	Ladder installed.
Elk River Lumber Co.	Humboldt	Elk River	Ladder installed.
Nevada-California Power Co.	Inyo	Bishop Creek	Ladder installed.
Nevada-California Power Co.	Inyo	Bishop Creek	Ladder installed.
Mono Power Co.	Inyo	Owens River	Ladder installed.
Empire Water Co.	Kings	Kings River	Ladder installed.
Empire Water Co.	Kings	Kings River	Ladder installed.
Crescent Canal Co.	Kings	Kings River	Legal notice served.
Riverdale Ditch Co.	Kings	Murphy Slough	Legal notice served.
Riverdale Ditch Co.	Kings	Murphy Slough	Legal notice served.
Lemoore Canal and Irrigation Co.	Kings	Kings River	Legal notice served.
Riverdale Ditch Co.	Kings	Murphy Slough	Legal notice served.
Lassen Townsite Co.	Lassen	Susan River	Ladder installed.
A. Bantley	Lassen	Susan River	Ladder installed.
Robert Elledge	Lassen	Susan River	Ladder installed.
Lassen Townsite Co.	Lassen	Susan River	Plans being made.
Red River Lumber Co.	Lassen	Robbers Creek	Plans being made.
Red River Lumber Co.	Lassen	Feather River	Plans being made.
Honey Lake Land and Livestock Co.	Lassen	Susan River	Plans being made.
Lassen Electric Co.	Lassen	Susan River	Plans being made.
Isaac Hinkle	Placer	North Fork American River	Ladder installed.
Mariposa Commercial Mining Co.	Mariposa	Merced River	Plans being made.
Nameless Mining Co.	Mariposa	Merced River	Plans being made.
Exchequer Mining Co.	Mariposa	Merced River	Plans made, but dam washed out.
San Joaquin Light and Power Co.	Mariposa	Merced River	Plans being made.
Union Mill and Lumber Co.	Mendocino	Pudding Creek	Ladder installed.
Crocker-Huffman Co.	Merced	Merced River	Plans being made.
Alturas Electric Power Co.	Modoc	Pine Creek	Plans being made.
Lakeview Development Co.	Modoc	Lawson Creek	Ladder installed.
Natural falls	Modoc	Lawson Creek	Falls blown out.
Melone Co.	Napa	Dry Creek	Ladder installed.
County of Napa	Napa	Redwood Creek	Legal notice served.
County of Napa	Napa	Redwood Creek	Legal notice served.
Elks Club	Napa	Redwood Creek	Legal notice served.
City Water Co.	Napa	Napa River	Ladder installed.
W. B. Lees	Napa	Redwood Creek	Legal notice served.
State Reformatory	Napa	Rector Creek	Legal notice served.
Pacific Gas and Electric Co.	Nevada	South Fork Yuba River	Ladder installed.
Excelsior Mining Co.	Nevada	Deer Creek	Ladder installed.
Excelsior Mining Co.	Nevada	Deer Creek	Ladder installed.
Pacific Gas and Electric Co.	Nevada	Little Deer Creek	Ladder installed.
Francis Newland	Nevada	Donner Creek	Legal notice served.
Pacific Fruit Express Co.	Nevada	Donner Creek	Ladder under construction.

Owner	County	Stream	Action
Truckee General Electric Co.	Nevada	Truckee River	Ladder installed.
Union Ice Co.	Nevada	Prosser Creek	Ladder installed.
Union Ice Co.	Nevada	Little Truckee River	Ladder installed.
Truckee River General Electric Co.	Nevada	Truckee River	Ladder installed.
Floriston Pulp and Paper Co.	Nevada	Truckee River	Legal notice served.
National Ice Co.	Nevada	Truckee River	Legal notice served.
Great Western Power Co.	Plumas	North Fork Feather River.	Repairs made on ladder.
Grizzly Creek Ice Co.	Plumas	Grizzly Creek.	Ladder installed.
Clairville Lumber Co.	Plumas	Middle Fork Feather River	Dam blown out.
White Pine Lumber Co.	Plumas	Long Valley Creek	Ladder installed.
Fred. Stoukey	Plumas	Long Valley Creek	Plans being made.
Sloat Lumber Co.	Plumas	Long Valley Creek	Plans being made.
Natomas Consolidated Co.	Sacramento	American River	Legal notice served.
Stockton-Mokelumne Co.	San Joaquin	Mokelumne River	Legal notice served.
H. Losse	Santa Clara	Stevens Creek	Plans being made.
J. A. Ferbrache	Santa Clara	Little Arthur Creek	Plans being made.
Watsonville Water Co.	Santa Cruz	Corralitos Creek	Plans being made.
San Jose Water Co.	Santa Clara	Campbell Creek	Legal notice served.
Rowardennan Improvement Co.	Santa Cruz	San Lorenzo River	Legal notice served.
Brown's Valley Co.	Santa Cruz	Brown's Creek	Ladder installed.
Northern California Power Co.	Shasta	North Battle Creek	Legal notice served.
Geo. Raish & Sons	Shasta	Hazel Creek	Legal notice served.
Bennett Smith	Siskiyou	Salmon River	Ladder installed.
Bonally Mining Co.	Siskiyou	Salmon River	Plans being made.
Salmon River Mining Co.	Siskiyou	Salmon River	Plans being made.
Mrs. Mary Reeves	Siskiyou	Indian Creek	Legal notice served.
Mrs. Golden	Siskiyou	North Fork Salmon River	Plans being made.
Spaulding Mill Co.	Siskiyou	Little Shasta Creek	Plans being made.
Edson-Foulke Co.	Siskiyou	Shasta River	Plans being made.
Siskiyou Electric Power and Light Co.	Siskiyou	Shasta River	Ladder installed.
Henry Flock	Siskiyou	Shasta River	Plans being made.
John Antone	Siskiyou	Shasta River	Plans being made.
Cantara Lumber Co.	Siskiyou	Sacramento River	Legal notice served.
Cloverdale Light and Power Co.	Sonoma	Sulphur Creek	Ladder installed.
Andrew Erickson	Sonoma	Sonoma Creek	Dam washed out.
U. S. Government	Sutter	Yuba River	Plans being made.
Northern California Power Co.	Tehama	South Battle Creek	Legal notice served.
Northern California Power Co.	Tehama	South Battle Creek	Legal notice served.
Northern California Power Co.	Tehama	South Battle Creek	Legal notice served.
Los Molinos Land Co.	Tehama	Mill Creek	Plans being made.
Los Molinos Land Co.	Tehama	Mill Creek	Plans being made.
Vina Ranch	Tehama	Deer Creek	
Clough Brothers	Tehama	Mill Creek	Ladder installed.
Gee & Griffiths	Trinity	Hayfork River	Dam blown out.
Robert Gibson	Trinity	Brown's Creek	Ladder installed.
Bull & Moxon	Trinity	Big Creek	Ladder installed.
Enos & Trimble	Trinity	Hayfork River	Legal notice served.
Valdor Mining Co.	Trinity	Canyon Creek	Legal notice served.
Sheperson Co.	Trinity	Salt Creek	Dam blown out.
Western States Gas and Electric Co.	Trinity	Canyon Creek	Legal notice served.
Enterprise Mining Co.	Trinity	East Fork Trinity River	Legal notice served.
Hayfork falls (natural)	Trinity	Hayfork River	Falls blown out.
Geo. Fenwick	Trinity	East Fork of North Fork, Trinity River.	Legal notice served.
California Safe Deposit Co.	Trinity	East Fork Trinity River	Legal notice served.
F. Anderlini	Trinity	Rush Creek	Dam blown out.
Trinity River Water and Power Co.	Trinity	East Fork Trinity River	Legal notice served.

Owner	County	Stream	Action
Ralph W. Bull	Trinity	Big Creek	Legal notice served.
H. Hampton	Trinity	Reddings Creek	Legal notice served.
Dr. D. B. Fields	Trinity	Indian Creek	Legal notice served.
Trinity Dredging Co.	Trinity	Stewarts Fork, Trinity River.	Legal notice served.
H. Danninbrink	Trinity	Canyon Creek	Dam blown out.
Leach Brothers	Trinity	Hayfork River	Ladder installed.
Pacific Gas and Electric Co.	Yuba	Yuba River	Ladder under construction.
U. S. Reclamation Service	State of Nevada	Truckee River	Ladder under construction.

The pollution of the streams has been given as much attention as our time has allowed. We have had several aggravated nuisances abated and have others pending. The Shasta River, which has been polluted with sawdust for years past, from old sawdust dumps as well as some from recent operations, is now free from pollution. Dams, ditches and restraining walls have been constructed according to plans furnished by this department and there will be no further trouble from that source.

One of the important cases that I desire to call to your attention, is the pollution of the Truckee River by the Crown-Columbia Paper Company. The commission in past years has endeavored to find a way to have the sulphite liquor from the factory deposited where it would not pollute the water of the Truckee River. Several attempts had been made by the company acting under the direction of the commission to have this liquor piped into a settling basin near the plant where it was supposed that it would be absorbed or evaporated, but owing to the loose formation of the rock, it found its way back into the river and caused a serious damage to the eggs deposited by the spawning fish, as was fully demonstrated by the experiments carried out by this department during the fall of 1912, when F. A. Shebley and N. B. Scofield made practical and scientific tests to determine the deleterious action of the sulphite liquor on fish eggs and embryo fish below the paper mill. Last winter the writer and Professor Dinsmore of the University of Nevada were appointed a committee, by your honorable board, to confer with Mr. Louis Bloch, the manager of the paper company, to determine on the best method to prevent the sulphite liquor from polluting the Truckee River. The company had agreed to make any changes that could be suggested along practical lines, either to evaporate the liquor, or to pipe it to some basin where it could be absorbed in the earth and not reach the river. Professor Dinsmore has made a couple of trips to other states where similar plants are located, in an effort to find a practical solution of the problem, and we are at this date awaiting his return, before taking action. If an evaporator can not be constructed that will be a positive success, I respectfully recommend that a pipe line be constructed that will carry the liquor from the mill to some distant point where it can not do any damage. If this can not be done, I would recommend that the company be restrained by an injunction from further operations until at such time they can find a way of disposing of the sulphite liquor from their mill. I believe that an evaporator can be installed that will evaporate the chemically charged liquor at an expense that will not be prohibitive to the company, and I earnestly hope that this may be accomplished this summer.

SISSON HATCHERY.

Sisson hatchery has been conducted on the same general plan as in the past, as far as the rearing of stock fish and the distribution of trout fry are concerned.

The policy adopted of holding and feeding all of the salmon fry before releasing them, and then only when the flood season is over in the spring, will unquestionably give good results. In my opinion it was the holding and feeding of the salmon fry in the early history of the Sisson hatchery that increased the run of salmon in the Sacramento River, and the present run is largely due to the efforts along those lines in the days when the commission established the Sisson hatchery in an attempt to restore the salmon in the Sacramento River.

Following is a short history of the work at Sisson hatchery during the first years of its operation, which gives my ideas of the results of holding and feeding salmon fry:

The first salmon fry fed in California was after the establishing of the Sisson hatchery in 1888. The United States Commission, in 1883, quit operations at Baird hatchery on the McCloud River. Only 1,000,000 eggs had been taken that season. The salmon had greatly decreased in the Sacramento River, owing to the operations of the mines on the tributary rivers, destroying the spawning beds and the unrestricted fishing on the lower reaches of the river, as well as the wholesale slaughter of the breeding fish by miners, Indians and others during the period that they were entering the tributary streams to spawn.

In 1883, the United States Commission collected approximately 1,000,000 of eggs at the Baird hatchery during the entire season, this being the smallest take in the history of the work on the McCloud River, since the preliminary work of establishing the station in 1872, when the first attempt at the propagation of the Pacific salmon was made by Dr. Livingston Stone. The salmon, though greatly depleted in numbers in the Sacramento River, had ascended as far as Baird in numbers sufficient to give from 2,000,000 to 14,000,000 eggs each season from 1872 to 1883. This year the salmon in the Sacramento River seemed doomed to extinction. The failing of this year was due largely to the heavy blasting and other operations on the line of the Southern Pacific Railroad, which was then being constructed from Redding northward along the banks of the Sacramento River to the mouth of the Pit River, into which the McCloud River flows. The salmon were undoubtedly frightened so that they did not ascend the Sacramento River, besides a great many were taken and destroyed by the grading gangs and used in the camps for food. Thousands of trout and salmon were destroyed by powder used by the Chinese and white laborers, of whom there were 9,000 camped along the river; and while a great many were used as food, there was wanton destruction in the way they were killed. The same condition existed in 1884, and Superintendent Stone of the Baird hatchery recommended that the station be not operated that season. It remained closed from that date until 1888, the year that the Sisson hatchery was established by the California Fish Commission, in an attempt to restore the salmon run in the Sacramento River.

In 1885 the California Commission decided to establish a hatchery for the propagation of salmon, as the federal government had not again resumed operations at Baird. It was decided to establish a hatchery and an egg collecting station on Hat Creek, a large tributary of the Pit River, where salmon formerly abounded by the thousands during the spawning season. This station was operated for two seasons. The writer was in charge of the work during the last season this station was operated. The work of collecting the eggs was begun early in August and continued until November. Less than 500,000 eggs were collected as the result of the season's work. The spawning beds in Pit River and Hat Creek, that a few years before had been covered with salmon, were now deserted. In the spring of 1888 recommendations were made to the Board of Fish Commissioners and to the Governor of the state to abandon the hatchery or close it down for a number of years, and that a station be established lower down the Pit River or on the main Sacramento River to endeavor to collect the eggs from the few remaining salmon that ascended the Sacramento to the spawning grounds. It was demonstrated beyond any doubt during the two seasons that the Hat Creek hatchery was operated that the spawning salmon that remained did not reach Hat Creek nor the Pit River near its confluence with Hat Creek in numbers sufficient to justify further operations. It was evident to the writer and others who made a study of conditions regarding the spawning salmon, that owing to the greatly diminished number of fish that ascended the Sacramento River, that ample spawning beds were found by the fish lower down and that only a few stragglers ascended Pit River and its tributaries. Acting under the recommendation of the writer, the Board of Fish Commissioners ordered the Hat Creek station closed, and began to look for another site.

After a thorough examination and study of the different streams by J. G. Woodbury, the newly appointed Superintendent of Hatcheries, it was decided to locate a salmon hatchery on Spring Creek in Siskiyou County, near the town of Sisson. In the mean time arrangements had been made with the United States Commission to open up the Baird hatchery, collect the eggs at that station and ship them to Sisson, where they could be hatched and the fry reared and fed until they were large enough to liberate in the tributaries of the upper reaches of the Sacramento River. This location and plan of hatching and distributing the salmon fry was concurred in by Mr. Woodbury, representing the California Fish Commission, and Dr. Livingston Stone, Superintendent of Baird hatchery, and the first fish culturist to attempt the propagation of the Pacific salmon. Mr. Woodbury had been Dr. Stone's assistant at Baird during the time of the establishment of the Baird station, and no better authorities on salmon culture could be found, and to this day no marked improvement over their ideas and work has ever been advanced. The writer had personal knowledge of their plans and consulted and worked with both gentlemen.

The Sisson hatchery was completed and ready for operations in September, 1888. The floods did not interfere with the work, and Dr. Stone operated until late in November. Eight hundred thousand eggs were collected from the early fall run and 2,200,000 from the October and November, or late fall run. These eggs were hatched and the fry fed until they were large enough to care for themselves and then carefully distributed in the upper reaches of the Sacramento River and its tributaries. The work of feeding the fry was continued until 1895, when the feeding of the fry was discontinued by the Board of Fish Commissioners, as a matter of economy and a wrong idea that had been advanced by those who were dictating the policy of the fish cultural operations in California, that the salmon fry were better off if distributed as soon as the umbilical sac was absorbed. The benefit of feeding the fry was plainly demonstrated by the great increase of the salmon in the Sacramento River in the years that followed the return of the output of fry from 1888 to 1896. In 1896, 27,000,000 eggs were collected at Battle Creek station, a few miles below the mouth of the McCloud River, and 7,000,000 at Baird station from the McCloud River. During these years a better and more efficient patrol of the bays and rivers was made during the close season than formerly. The laws regarding the legal size of nets used in fishing were enforced, and the Saturday-Sunday non-fishing law was enforced strictly. This insured a larger number of breeding salmon for the egg collecting stations. These regulations and the feeding of the salmon fry during the period from 1888 to 1896 were, in my opinion, the principal agents in restoring the salmon in the Sacramento River.

After the appointment of the present Board of Fish and Game Commissioners during the summer of 1911, and the reorganization of the department of hatcheries, it was decided to again hold and feed the salmon fry until they were large enough to care for themselves when they were distributed, as well as to hold a large number of them in the ponds at the Sisson hatchery until fall, and then release them in the upper reaches of the Sacramento River during the early fall, before the winter floods. This method of handling the salmon fry will give them a chance to reach the ocean at an age when they can protect themselves from the predaceous spiny rayed fishes that inhabit the lower reaches of the Sacramento River and Suisun, San Pablo and San Francisco bays, through which they must pass before they reach the ocean. During the season of 1913 three quarters of a million salmon fry were held in the ponds at the Sisson hatchery and released during October. This season 21,000,000 salmon fry were held in the troughs, nurseries and ponds and fed until late in the spring. Of this number 2,000,000 were distributed by the California Fish and Game Commission's distributing car in the lower reaches of the Sacramento River near Walnut Grove and Benicia. Four million were placed in the large ponds at the Sisson hatchery in perfect condition, where they are fed daily and looked after by a skilled fish culturist. The remainder were distributed in the tributary streams of the upper Sacramento River. Those placed in the ponds will be released during the early fall, so that they can descend the river slowly and reach the lower reaches of the river and the bays at a time when the spiny rayed fishes are not so active as they are during the summer months. After the temperature of the river falls the bass and other predaceous fishes are not so active in the pursuit of food, and the salmon fry will reach the ocean with less loss than if they are released in the spring or summer.

The Fish and Game Commission of the State of California is now preparing one of the largest and best pond systems for the rearing of salmon fry in the country. Plans are being made to construct enough ponds to hold 10,000,000 of salmon fry next season.

The fry at the Sisson hatchery are first held and fed in the troughs about two months before they are removed to the ponds. Then they are taken out in small lots and fed until all are accustomed to the new surroundings. The pondkeeper distributes the food slowly at the different feeding stations in the ponds, until he is satisfied that all the fry have received their share of food. By this method the fry all make the same development and growth and there is not any danger of developing a lot of precocious fry to exercise their cannibalistic instincts on the others. During the first cold weather in the fall the fry are ready to be liberated. They are then in readiness for their trip to the ocean at a time when there is not any danger of their being carried into the overflow basins, when many of the predaceous fishes have lost their activity, and when the salmon fry are large enough and conditions of weather and water are such that they will not linger long in the lower reaches of the Sacramento River and bays, but will descend to the ocean with less loss and in better condition than if handled in any other way.

The large island district in the lower Sacramento River, and the bays through which it flows before reaching the ocean, makes the propagation of the salmon a different problem than in any other stream on the Pacific coast. If it were not for the conditions above mentioned, the fry could be hatched and distributed nearer the ocean, but on account of the large bodies of water inhabited by predaceous fishes at the mouth of the Sacramento River it is necessary to hold the fish as long as possible near the upper reaches of the river, and release them at a time when they will make the journey to the ocean in the shortest time possible, if the best results are to be obtained.

During the past year three new ponds have been constructed for the rearing of brood fish, making in all a total of fifty-one ponds and nurseries. With the increasing demand for fish to stock our streams it is necessary to increase our pond system, to enable us to raise stock fish enough to supply the eggs. The loss to our rainbow stock has not been made up as yet. The unwise policy of releasing the stock of rainbow on hand in the beginning of 1911 has caused a shortage in our distribution this season of this variety of fish. The streams in which the wild eggs can be collected can not be depended on. We must depend on our stock fish in the ponds, if we desire a regular supply of eggs each season. This season the tremendous snows of last winter, that kept the tributary streams of the Klamath River high, roily and cold during the spawning season, caused the run of rainbow trout into the tributary streams to be very small, and as our stock of young rainbow trout are not old enough to breed, our take of eggs was limited, as will be shown by the table of distribution. We hope to have sufficient stock fish in our ponds within the next fifteen months, with a few collected from the streams, to meet the demands of the public for fish to stock the waters throughout the state. On the following pages is a list of the streams stocked in 1913.

We have for distribution during the season of 1914, 7,832,000 fry, consisting of the following varieties: Loch Leven, Eastern brook, rainbow, steelhead, black spotted and large lake trout.

The total number of fish on hand in the ponds at Sisson hatchery July 1, 1914, is as follows:

Rainbow trout:		
Adults	2,600	
Two years old	5,000	
One year old	12,000	
Fry	30,000	
		49,600
Loch Leven trout:		
Adults	9,000	
Two years old	1,200	
One year old	13,000	
Fry	25,000	
		48,200
Eastern brook trout:		
Adults	5,500	
Two years old	1,200	
One year old	32,000	
Fry	25,000	
		63,700
Miscellaneous:		
Land-locked salmon, yearling		1,100
Golden-rainbow, adult		45
Grayling, two years old		180
Grayling, one year old		1,400
Total		164,225

TAHOE HATCHERIES.

The Tahoe hatcheries consist of three stations, Tahoe, Tallac, and Glen Alpine. These hatcheries have been under the supervision of E. W. Hunt for the past twenty years, and the results of his management are excellent. The Tahoe and Tallac hatcheries are the property of the state. Glen Alpine is a substation operated in connection with the Tallac hatchery. It is only a small building, the property of the Glen Alpine Hotel Company. It is used by the commission to hatch out a few hundred thousand eggs to save the cost of transportation of the fry. The fry from this station are distributed in the high lakes in the vicinity of Glen Alpine Springs. The principal lakes stocked from this station are Lily Lake, Grass Lake, Susie Lake, Heather Lake, Gilmore Lake, Lucille Lake, Half Moon Lake, Lake of the Woods and Glen Alpine Lake. These small mountain lakes afford excellent fishing for those who desire to make the trip in this region. Glen Alpine hatchery was not operated during the season of 1913 as the run was late and the number of eggs collected did not justify the expense of operating this station.

Tahoe and Tallac hatcheries were operated as usual. The fry hatched out in good condition and were distributed, in the places as shown by the statistical report of the distribution from the Tahoe and Tallac hatcheries for 1913.

This season (1914), Superintendent Hunt was given instructions to get on the ground as early as possible with his crew, as it was the desire of the commission to collect as many of the eggs of the black spotted trout as possible. Mr. Hunt began operations at the mouth of Taylor Creek with his seining crew on April first and collected 5,548,000 eggs. After placing as many eggs as could be safely handled in the Tallac, Tahoe and Glen Alpine stations, the remainder were shipped to Wawona and Sisson hatcheries. The work of the artificial propagation of the black spotted trout at the Tahoe hatcheries has been productive of good results, and the large number of fish taken from the waters of Lake Tahoe and other lakes in that region speak well for the system of work carried on at these hatcheries. The increasing number of fishermen that visit this region each year, owing to the easy trip to the lake by railroad and automobile, causes a demand for a larger output of fry into Lake Tahoe and the lakes of the Tahoe Basin.

I respectfully recommend that the Tahoe hatchery be improved, and enlarged to twice the present capacity. The water supply is limited at the Tahoe hatchery, but I believe that it can be arranged under a different system than the one now in use to double the capacity of this station. If this can not be done, I would suggest that another location be selected for a new hatchery with a capacity of at least 3,000,000 eggs and that arrangements be made for holding the fry until later in the fall before making the distribution. The large lake trout (*Salmo tahoensis*) should be propagated in as large numbers as possible. A well constructed trap should be placed in the Little Truckee River this fall, so that when the run begins next spring no time would be lost and as many eggs collected from this stream as possible. Nearly all the large lake trout spawn in Blackwood Creek and the Little Truckee River. A few enter some of the other creeks, but their numbers are not great enough to justify the expense of trying to collect their eggs. The smaller variety (*Salmo henshawii*) can always be taken in sufficient numbers at the mouth of Taylor Creek to supply all the eggs necessary for stocking the waters of the Tahoe Basin.

BROOKDALE HATCHERY.

Brookdale hatchery was operated during 1913 by the Fish and Game Commission under a lease from Santa Cruz County. Mr. F. A. Shebley has been in charge of this station since it was established in 1905. It is not necessary to mention the efficiency of his management regarding the steelhead work in Santa Cruz County. The increased number of fish in the streams stocked from the Brookdale hatchery since its institution are all the evidence necessary of the valuable work of this station. In the statistical tables will be found the result of the operations of this station for 1913.

This season the commission entered into a contract to purchase the eggs from Santa Cruz County, and gave up the lease. The price agreed on was that the Fish and Game Commission was to pay one dollar and fifty cents per thousand for the eyed steelhead eggs, up to the number of two million, and one dollar per thousand for all eggs that the county of Santa Cruz could furnish up to 3,000,000, provided that the eggs were collected and eyed by a skilled fish culturist and would pass inspection before they were accepted. F. A. Shebley was placed in charge of the work.

The Commission owned property jointly with the county, that was purchased several years ago, to the value of $796.65. This the county of Santa Cruz accepted in part payment of eggs furnished the state.

PRICE CREEK HATCHERY.

Price Creek hatchery has been under the supervision of Mr. W. O. Fassett, who has successfully operated this station for the past fourteen years. We are pleased to note that the salmon are yet plentiful in Eel River, and do not show any signs of a decrease, although the fishing has been as heavy as in past years. This hatchery was established in 1898 at a time when the average number of salmon shipped did not exceed 500,000 pounds. Five years after the artificial propagation of the salmon the number had increased to over 1,500,000 pounds annually. The salmon eggs that restored the run of salmon in Eel River were the surplus eggs shipped from the Sacramento River stations.

In the fall of 1912 we made arrangements to collect the salmon eggs for the Price Creek hatchery by purchasing the mature fish from the fishermen at a nominal cost, but we were not successful. The fishermen did not respond as readily as we expected. They were too anxious to get their fish to the market to assist us by furnishing us the mature fish to supply the eggs so that we could keep up the supply of salmon in the river without a decrease in numbers. During the fall of 1913 we made arrangements to collect the eggs with our own crews. Accordingly Superintendent Fassett was instructed to construct the necessary live cars to hold the fish, and plan to seine the pools for mature fish. A skilled egg collector was sent to assist him in the work. The work started off auspiciously, but just as the run was at its best an unusual storm set in that caused the river to rise and allowed the spawning salmon to leave the pools in the lower reaches of the river, where they congregate before ascending the river to spawn. Before the freshet caused the river to rise a number of mature fish were taken and 472,250 eggs were collected; these, with 3,611,000 eggs shipped from Mill Creek station, were successfully hatched and the fry liberated in Mad River, Elk River, Jacoby Creek, Freshwater Creek and Eel River and Price Creek, as will be shown by the table of salmon fry distribution.

I would recommend that if the funds are available, a well built restraining rack be constructed across Eel River to hold the salmon, and another attempt made this fall to collect the eggs of the salmon from this river. Eel River is one of the most difficult rivers on the coast to construct racks in, as it rises suddenly, and the bed of the river is formed of such a deep deposit of loose gravel and sand that is always shifting whenever there is a rise in the river, which makes it a very expensive piece of work to construct racks that will hold the salmon. The best that can be expected would be a rack that would stand a rise of two or three feet at the most. To attempt to construct a larger rack would be very expensive and one that would require heavy piers sunk deep in the gravel with the bed of the river floored with brush and rock. It would not be practical to construct anything but low racks to withstand a rise of two or three feet. During normal seasons the river would not rise enough to damage the low racks until the salmon run was practically over. If the funds are available, I would recommend the construction of a rack as described above, and preparations made to collect the salmon eggs from Eel River this fall to supply the Price Creek hatchery.

UKIAH HATCHERY.

Ukiah hatchery is located one mile from the town of Ukiah, Mendocino County. It is the property of the city of Ukiah. The state is given permission to use this hatchery through the courtesy of the city of Ukiah. It has been in operation for a number of years under the supervision of Mr. A. V. LaMotte, one of the oldest fish culturists in the state. Mr. LaMotte is particularly successful in the propagation of the steelhead trout.

The Ukiah hatchery was not operated during the season of 1913. Owing to the extremely low water in the streams it was not considered necessary to operate this station, as a sufficient supply of eggs could be collected from Scott Creek to stock all the streams. The streams contiguous to the Eel River and Russian River basins, as well as the streams of Marin County, were stocked with steelhead fry hatched at Sisson hatchery from eggs shipped from Scott Creek station.

As the season of 1914 appeared to be propitious for the collection, propagation and distribution of trout fry, owing to the streams being again filled with an abundance of water after the heavy storms of last winter, it was decided by the commission to operate all the hatching stations to their fullest capacity, if sufficient eggs could be collected. The Board of Fish and Game Commissioners, early in the year, received permission from the Snow Mountain Water and Power Company, to collect eggs at their dam in Eel River and use the old eyeing station for the purpose of preparing the eggs for shipment to Ukiah hatchery.

After the necessary repairs had been made, the crew began work on February 10th and collected 1,713,000 eggs. Eight hundred eighty-one thousand eggs were shipped to Sisson where they were hatched and are now being distributed in the streams throughout the coast counties. The Ukiah hatchery was filled to its normal capacity with eggs (550,000), which hatched in good condition and the fry will be distributed in the streams of Sonoma and Mendocino counties.

The Snow Mountain egg collecting station on Eel River is a very important station and should be owned by the state. It will, if the Eel River is kept well stocked, furnish several million steelhead eggs each season.

I respectfully recommend that the Fish and Game Commission take the necessary steps to establish a permanent egg collecting station at, or near, the Snow Mountain dam, for the purpose of collecting the eggs to stock Eel River as well as the streams tributary to the Russian River and throughout Sonoma and Marin counties.

I would respectfully call the attention of the commission and the legislature to the fact that all of our steelhead stations are held by leases and that the commission is only operating through the courtesy of the owners of the different stations. I would recommend that one or two streams be selected for permanent steelhead trout egg collecting stations, and that the legislature pass an act setting these streams aside as permanent egg collecting streams, and that no fishing be allowed at any time on the streams selected for this work. In my judgment, if these egg collecting reserves be set aside and properly cared for, enough eggs can be collected from the steelhead trout to stock all the coastal streams of California from Little River, Humboldt County, to the Ventura River in Ventura County. If this work is carried out systematically and the coastal streams properly stocked each year, an open season of two months or two months and a half during the winter months could be declared for catching the large steelhead trout when they first leave the ocean to enter the coastal streams. I make this recommendation with this reservation—that the season for taking the large fish be not opened to any but the anglers taking the fish with hook and line, and then only when these egg collecting stations are established and all preparations made for collecting enough eggs to stock the streams in all the coast counties from Humboldt County to the Ventura River.

WAWONA HATCHERY.

The Wawona hatchery was erected by the Washburn brothers in 1895 under an agreement with the commission that it should be operated each season to stock the inaccessible regions above the Yosemite Valley.

The writer had made several trips with fish in that region previous to that time, and successfully stocked a number of lakes and streams above the Yosemite Valley, but the work was hard and expensive. The hatchery was constructed in the spring of 1895 and the first black spotted trout hatched during June of that year. Since that time the hatchery has been operated each season for a period of about three months, and the excellent fishing in the lakes and streams of that region speak well of the work from this station. Mr. M. L. Cross has been very successful in handling the station. He has had charge of the work at this station for the past ten years, except the season of 1912. He is an experienced and capable man for this work, and when the conditions of the water are considered during the warm summer weather, the excellent condition of the fish distributed from this hatchery speak well of the skill and good judgment used by Mr. Cross in rearing the fry.

The Wawona hatchery was operated during 1913 and also this season, and 220,000 fry were distributed in 1913, a list of which will be found in the table of distribution. This season 242,000 eggs of the black spotted trout were hatched in good order and the fry are now (July 1st) ready for distribution.

The Wawona hatchery is old and dilapidated and should be replaced by a more modern building. A better site should be selected where an abundance of cold water can be had. The supply of water at Wawona station is too warm to hold the fry as long as desired, and I respectfully recommend to your honorable board that a new site be selected near Wawona, on one of the streams tributary to the Merced River where the water is colder, and where the fry can be held longer before they are liberated. The state should get a lease or permit, if a site should be selected in the Yosemite National Park, and erect the hatchery. The Washburn brothers have been fully repaid for their kindness in erecting the hatchery that has done so much good work in the last nineteen years, and the state should now construct a building on their own property, and endeavor to keep this region well stocked by a larger and more up to date hatchery.

THE SACRAMENTO EXPERIMENTAL STATION.

During the fall of 1912 and the winter of 1912-13, the experimental work of attempting to hatch the salmon eggs with the water pumped from wells in the vicinity of the city of Sacramento were continued. The results of the previous winter were not satisfactory. Although a fair percentage of the eggs hatched the embryos were soon affected by the minerals in solution in the water and the lack of well oxygenated water. The water did not have the life sustaining qualities of mountain stream water, although a well arranged system of aeration was used.

During the winter of 1912-13, the well on the Sherburn tract was again pumped. This well appeared to contain less mineral than the other wells in this section that had been tried out. We arranged the troughs in a barn that had been rented, for the purpose of using it for a hatchery, and conveyed the water in a flume from the well on the Sherburn tract that gave the best results the season before, hoping that a better aeration and longer pumping of the well would improve the condition of the water; but we were disappointed. After heavy pumping of the well for a few days, the eggs were placed in the troughs and the development closely watched. The eggs were carefully tested and examined on arrival and found to be in perfect condition. A few hours after they were in the water they began to change from their natural color to a reddish brown. The embryos soon showed signs of distress by a quick, spasmodic motion in the shell, plainly exhibiting the distress they were in from the action of the mineralized water. A few days later they hatched prematurely, and began dying in great numbers shortly after hatching. The shells by the time the embryos first began hatching were stained to a dark brown color. The troughs, flume, baskets, and other hatching apparatus were all covered with a coating of a reddish brown substance, consisting of iron, barium, etc. The effect of the water from this well was worse on the eggs and embryos this season than in any of the previous experiments. The action of the water was so deleterious that it was only a question of a few days when the embryos would have all been destroyed, so I instructed the employees to deposit the remaining embryo salmon in the Sacramento River and to close the station. The troughs and other apparatus were shipped to Sisson hatchery.

In my opinion there is not any well water in the Sacramento Valley in which the salmon eggs will hatch successfully. I would not recommend any more experiments along these lines as I feel positive that the well water all through the valley contains too much mineral to hatch salmon eggs without destroying, or injuring them so badly that they will not thrive, if they should hatch out. All eggs of the *Salmonidæ* of any species require pure cold spring or mountain stream water in which to hatch. The eggs are very absorbent, and any mineral substance in the water, no matter how small in amount, is gradually absorbed in the economy of the egg, and the embryos will be affected or destroyed from its action.

RECOMMENDATIONS.

With the rapidly increasing population of California, a proportionate increase of hatchery work should be carried on, if the streams and lakes of this state are to be kept in condition to meet the demands of the population. All the hatchery stations should be enlarged and improved, and new stations established within the next two or three years.

In my report for 1912 I recommended the erection of a hatchery in southern California, and if suitable conditions are yet to be found, I would recommend the construction of a hatchery of about 1,500,000 capacity. One million five hundred thousand fry properly reared and distributed will keep the streams that are in condition to support trout well stocked. This does not include the streams and lakes in the Seventh District. The streams and lakes of the Seventh District can be supplied from Sisson hatchery. If a suitable site with sufficient water can not be found in the counties lying contiguous to Los Angeles and farther south, I would recommend that a hatchery be established in the Seventh District large enough to supply all the fry necessary for southern California.

Before erecting a large plant in southern California, it is necessary to rear enough stock fish at Sisson or at some other station to furnish the eggs necessary to supply this region. The steelhead eggs can be collected on our northern coast if arrangements are made to do so. The rainbow eggs can be supplied from our northern stations. The Loch Leven can be supplied from Sisson hatchery. They will thrive in the streams of the higher regions. The black spotted trout will do well in Bear Valley Lake and in some of the higher lakes and reservoirs. The region in which the Eastern brook trout will thrive in southern California is limited, and only a very few will be required to stock all the streams in which they will thrive in southern California.

The Mantelpiece—on upper Bear Creek, San Bernardino County.

Owing to the failure of the rainbow trout to enter the tributary streams to the Klamath River in numbers great enough to give us our usual supply of eggs, I would respectfully recommend that egg collecting stations be operated on the tributaries of the Pit River. Mr. E. W. Hunt and myself have just returned from an inspection of the streams that enter Pit River in Shasta County, and believe that the chances are good to collect a large number of eggs in Burney Creek, Clark Creek and Hat Creek. There appears to be as many trout in that region as there were twenty-five years ago when we operated the Hat Creek hatchery. The eggs could be collected and conveyed by team to the old Hat Creek hatchery, where they could he held until they are advanced enough to stand shipping to Sisson or some of the other stations. The Hat Creek hatchery was closed down by the commission in the spring of 1888. The writer was in charge at the time. It was our impression that the state only held a lease on the land on which the hatchery was located. Mr. E. W. Hunt, superintendent of the Tahoe stations, was my assistant at the time.

Fish racks on Camp Creek.

The board recommended that the station be closed for a number of years as there were not salmon enough at that time in the Pit River to justify the expense of operating the station. Since then no attempt has been made to carry on fish cultural work in that part of the state. Two years age we were informed that the commission owned the land, and that the land that we supposed was held under a lease had been deeded to the state. A short time ago we had the records searched in Redding, Shasta County, and found an instrument on record that purports to deed to the State of California about three and one-half acres of land on the banks of Hat Creek, on which was built the Hat Creek hatchery and the mess house. The same buildings are there in a good state of preservation today. The only questionable thing regarding the deed is that of the description of the boundary lines. They are not well defined, but when Mr. Hunt and myself visited the station on Hat Creek on July 14th we found the fences and buildings located as they were in 1888. I believe that we can establish the boundary lines as they were then recognized by all the interested parties. One of the signers to the instrument or deed declares that he only signed a lease and claims the land. The other party, who owns another portion of the land, is living, and we will endeavor to get him to assist us in clearing the title to the property. At the time the transactions were made, Mr. Hunt and myself were employed in the hatcheries and did not have any knowledge of the affairs of the commission, as they were then carried on at the head office. The deed on record in Redding was executed April 20, 1885, and in my opinion was drawn up by Judge A. B. Dibble, who was at that time President of the Board of Fish Commissioners. The original copy was probably lost during the fire in San Francisco in April, 1906. When I visited the Hat Creek station I placed Mr. Tucker in charge of the buildings and grounds until we could have the legality of the deed passed on and the boundary lines defined. If we can establish the right of the commission to this property it will make a fine hatching station in a few years, and can be used this winter for the purpose of eyeing the eggs preparatory to shipping them.

If the funds are available, I am of the opinion that better results can be obtained in distributing the fry by one of the messengers from the car accompanying each shipment and supervising the distribution, particularly so where the applicants are not familiar with the handling of the fry. I do not believe in the policy of hatching a large number of fish and having them handled by skilled fish culturists up to the time they are taken from the distribution car, and then turned over to some person who may lose a portion or all of them. A great many applicants have been receiving and distributing fish for years, and they are familiar with all the conditions to properly plant the fry, but we often receive applications from persons who have never handled any fish and they are apt to ignore the instructions on the printed sheet that is given to each applicant.

I again recommend that your honorable board call the attention of the legislature to the danger of allowing any one to introduce any more predaceous or spiny rayed fishes into the waters of this state. I would recommend the passage of an act making it a misdemeanor for any one to introduce any fish or fish eggs into the State of California without first obtaining permission from the Board of Fish and Game Commissioners, so that no one will ever be allowed to introduce any specie of fish that would be injurious to and probably exterminate our valuable food and game fishes. I would also recommend that every possible means be used to discourage the planting of black bass or any of the spiny rayed fishes in waters where trout will thrive. There is in this state sufficient water for all of these species of fishes without encroaching on the mountain lakes where trout will thrive and where the other varieties will live only to destroy the trout, but not to increase or thrive well enough to take their place.

I urge the recommendation made previously in this report that the 10 per cent water flow regulation be passed. This is a vital subject when the preservation of the trout and salmon are taken into consideration.

Bills were introduced during the last session of the legislature covering nearly all of the above mentioned subjects, but owing to the vicious onslaughts that we received from several demagogues who believed they were making themselves popular by attacking the Fish and Game Commission, our efforts failed and the measures that were introduced for the benefit of the people were left to die in the committees. It is to be hoped that the next legislature will act on these recommendations and pass them, for it is earnestly urged that these measures be passed for the conservation of the fish of the state.

I earnestly recommend the increasing of the hatchery work to meet the demands of the rapidly increasing population of the state. This must be done by increasing the capacities of our hatcheries, and the most important thing of all in my opinion is the increase of the number of ponds for rearing brood fish, and the setting aside of several good coast streams for steelhead trout preserves where enough steelhead trout can be taken each season to supply all the coast streams. If this is done, an open season during the winter months can be had.

This concludes my report. A great many things of importance have been carried on concerning the conservation of the fish through our efforts to install screens in the ditches and canals and fishways over the dams. We have the work well in hand at present, but it will take us at least a year or two longer, with our present crew, to complete this important work. I wish to express my gratitude to the Board of Fish and Game Commissioners for the support they have given me and those associated with me in this work. The earnest and hearty support of my superiors and the untiring efforts of my assistants have made the last two seasons' work among the most successful in the history of the commission.

Respectfully submitted,

W. H. SHEBLEY,
Superintendent of Hatcheries.

Sisson, California, June 30, 1914.

SISSON HATCHERY.

Fish Distribution, Season 1913.

DISTRIBUTION OF QUINNAT SALMON.

Date	Waters stocked	Number
Jan. 27	Cold Creek, tributary to Sacramento River, Siskiyou County	144,000
Jan. 28	Cold Creek, tributary to Sacramento River, Siskiyou County	144,000
Feb. 6	Cold Creek, tributary to Sacramento River, Siskiyou County	15,400
Jan. 29	Cold Creek, tributary to Sacramento River, Siskiyou County	975,000
Jan. 30	Cold Creek, tributary to Sacramento River, Siskiyou County	375,000
Jan. 31	Cold Creek, tributary to Sacramento River, Siskiyou County	975,000
Feb. 5	Cold Creek, tributary to Sacramento River, Siskiyou County	731,250
Feb. 20	Cold Creek, tributary to Sacramento River, Siskiyou County	975,000
Feb. 21	Cold Creek, tributary to Sacramento River, Siskiyou County	780,000
Mar. 18	Cold Creek, tributary to Sacramento River, Siskiyou County	975,000
Mar. 25	Cold Creek, tributary to Sacramento River, Siskiyou County	780,000
Apr. 1	Cold Creek, tributary to Sacramento River, Siskiyou County	650,665
Apr. 4	Cold Creek, tributary to Sacramento River, Siskiyou County	717,120
Apr. 9	Cold Creek, tributary to Sacramento River, Siskiyou County	1,323,856
Apr. 19	Cold Creek, tributary to Sacramento River, Siskiyou County	1,306,500
Apr. 30	Cold Creek, tributary to Sacramento River, Siskiyou County	1,134,900
May 9	Cold Creek, tributary to Sacramento River, Siskiyou County	884,376
May 30*	Held in Sisson Lake, Siskiyou County	550,000
June 17	Cold Creek, tributary to Sacramento River, Siskiyou County	100,000
	Total	14,137,067

*Fry held and fed in Sisson Lake. Released into tributary of Sacramento River, October 11, 1913.

SISSON HATCHERY.

Fish Distribution, Season 1913.

DISTRIBUTION OF LOCH LEVEN TROUT.

Applicant	Date	Waters stocked	Number
Grant P. Merrill	Aug. 31	West Carson River, Alpine County	25,000
F. M. Thatcher	July 30	Kimshew Creek, Butte County	22,500
Ray D. Head	July 30	Butte Creek, Butte County	5,000
R. H. Messinger	Oct. 5	Big Chico Creek, Butte County	10,000
H. M. Perry	July 30	Little Butte Creek, Butte County	10,000
John P. Fisher	Aug. 27	South Fork American River, El Dorado County	5,000
Lawrence & Comstock	Aug. 31	Cascade Lake, El Dorado County	7,500
C. A. Swisler	Sept. 14	Upper and Lower Echo lakes, El Dorado County	10,000
San Joaquin and Eastern Railway	Sept. 10	Big Creek Lake, Fresno County	40,000
E. B. Waterman	Sept. 10	Mill Creek, Fresno County	15,000
F. D. Hall	Aug. 14	Susan River, Lassen County	5,000
F. P. Cady	Aug. 14	Willow Creek, Lassen County	15,000
Wm. G. Kerckhoff	Sept. 24	San Antonio Creek, Los Angeles County	20,000
H. W. O'Melveney	Sept. 30	Bear Canyon and Cold Water Creek, Los Angeles County	37,500
Geo. E. Little	Sept. 30	Rio Hondo and San Jose creeks, Los Angeles County	5,000
E. D. Silent	Sept. 30	Truinfo Creek, Los Angeles County	2,500
California Anglers' Association	Aug. 9	Lake Lagunitas, Marin County	20,000
Yosemite Valley Railway	Sept. 18	Merced River and Moss Canyon, Mariposa County	25,000
Huffman & Washburn	Sept. 10	Merced River, Mariposa County	15,000
T. F. Dunnaway	Aug. 14	Goose Lake, Modoc County	10,000
Chas. E. Lethead	Aug. 14	Goose Lake, Modoc County	5,000
C. W. Williams	Aug. 14	South Fork, Pit River, Modoc County	5,000
A. Mosher	Aug. 14	South Fork, Pit River, Modoc County	7,500
Will W. Ahl	Aug. 14	Fitzhugh Creek, Modoc County	5,000
Jess Parman	Aug. 14	Eagle, Emerson and Rader creeks, Modoc County	5,000
J. Todd Bonner	Aug. 14	Canyon Creek, Modoc County	2,500
John L. D. Roberts	Sept. 6	Garrapitas Creek, Monterey County	25,000
F. M. Rutherford	July 7	Donner Lake, Nevada County	17,500
Nevada City Hunting and Fishing Club	Aug. 19	Deer Creek, Nevada County	10,000
W. Thompson	Aug. 19	Weaver and Bowman lakes, Nevada County	10,000
Grass Valley Sportsmen's Club	Aug. 31	Steep Hollow, Perriss and Barkers creeks, Nevada County	12,500
W. O. Murdoch	Sept. 18	Tributaries of Webber Lake, Nevada County	5,000
W. M. Avis	Sept. 24	Santa Ana River and tributaries, Orange County	5,000
Joseph Gowling	July 7	North Fork American River, Placer County	10,000
Katherine Chandler	July 8	Bear River, Placer County	7,500
Lake Tahoe Railway and Transportation Co.	Aug. 20	Watson Lake, Placer County	20,000
J. B. Knapp	Aug. 31	North Fork American River, Placer County	7,500
Geo. P. Kelley	Aug. 31	North Ravine, Placer County	5,000
H. M. Freeman	Aug. 31	Loch Leven Lakes, Placer County	20,000
Fred P. Tuttle	Aug. 31	Lake Stirling, Placer County	6,000
Frank L. Harmon	Sept. 18	Little Bear River, Placer County	5,000
Pacific Gas and Electric Co.	Oct. 7	Fordyce Lake, Placer County	12,500
G. N. Johnson	July 26	Smith Creek and Feather River, Plumas County	12,500
Chas. Jones	July 26	Grey Eagle Creek, Plumas County	12,500
W. D. Bernheim	July 26	Wade and Rock lakes, Plumas County	15,000
Geo. A. Hall	Sept. 28	Indian Creek, Plumas County	25,000
Quincy Chamber of Commerce	Sept. 14	Hungarian Lake and Spanish and Greenhorn creeks, Plumas County	25,000
H. G. Porter	Oct. 7	East Branch, North Fork Feather River, Plumas County	25,000
Strong & Dickinson	Sept. 30	Strawberry Creek, Riverside County	5,000
Jas. A. Vale	Sept. 24	Devil Canyon, and Santa Ana, Bear and Mill creeks, San Bernardino County	42,500
C. L. Watson	July 30	Clear Creek, Shasta County	10,000

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF LOCH LEVEN TROUT—Continued.

Applicant	Date	Waters stocked	Number
Kennett Athletic Club	Sept. 14	Big Backbone Creek, Shasta County	6,000
Mrs. Geo. W. Kenney	July 7	Lake Independence, Sierra County	7,500
F. J. Hunger	July 26	Upper and Lower Sulma lakes, Sierra County	10,000
A. S. Nichols	Sept. 14	Cool Creek, Sierra County	10,000
A. P. Wright	July 22	Mt. Eddy Lakes, Siskiyou County	6,000
Zick Abrams	Aug. 14	Abrams Lake No. 1, Siskiyou County	18,000
O. E. Pile	Aug. 23	Butte Creek, Siskiyou County	5,000
McCloud River Railroad Co.	Aug. 30	McCloud River, Siskiyou County	12,500
Wm. J. Bray	Sept. 1	Antelope Creek, Siskiyou County	7,500
R. S. Taylor	Sept. 2	Taylor Creek, Siskiyou County	5,000
Ed. F. Jared	Sept. 2	Shasta River, Siskiyou County	7,500
Zick Abrams	Sept. 5	Abrams Lake No. 2, Siskiyou County	9,000
W. E. Tebbe	Sept. 19	Salmon River, Siskiyou County	2,500
Robert Rupp	Sept. 26	Sullaway Creek, Siskiyou County	10,000
J. H. Hoerl	Sept. 28	Sullaway Creek, Siskiyou County	10,000
Chas. Wright	Oct. 1	Cold Creek, Siskiyou County	40,000
W. E. Tebbe	Oct. 9	South and Main branches Etna Creek, Siskiyou County	5,000
Porterville Fish and Game Protective Association	Sept. 10	South Tule River and North Branch of South Tule River, Tulare County	25,000
Tule River Shooting and Fishing Club	Sept. 10	McIntyre, Boulder and Bear creeks, Tulare County	15,000
Widgeon Gun Club	Sept. 10	Kaweah River and Monarch Lake, Tulare County	22,500
Deer Creek Fish and Game Protective Association	Sept. 10	North and South Deer creeks, Tulare County	10,000
Berry and Cramer	Sept. 10	Spears Creek, Tulare County	5,000
Major Wm. T. Littlebrandt	Sept. 18	Evelyn and Fletcher lakes and 2 unnamed lakes, and Bogelsang Lake, Tuolumne County	25,000
J. B. Curtin	Sept. 14	South Fork Tuolumne River, Tuolumne County	5,000
G. F. Conlin	Sept. 14	Herring Creek, Tuolumne County	25,000
L. H. Elliott	Sept. 14	Main Fork Stanislaus River, Tuolumne County	20,000
Jas. A. Rasmussen	Sept. 24	Ventura River, Ventura County	20,000
E. D. Silent	Sept. 30	Truinfo Creek, Ventura County	2,500
Filmore Chamber of Commerce	Sept. 30	Sespee Creek, Ventura County	10,000
		Held in ponds at Sisson Hatchery	90,000
			1,132,500

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF EASTERN BROOK TROUT.

Applicant	Date	Waters stocked	Number
W. H. King	July 26	Flea Valley and Dogwood creeks, Butte County	10,000
F. M. Thatcher	July 30	Kimshew Creek, Butte County	17,500
W. M. Pence	July 30	Honey Run and Dry Creek, Butte County	12,500
Ray D. Head	July 30	Butte Creek, Butte County	10,000
Murphy Bros. & Morgan	Aug. 20	Hank Richardson and Miller lakes, El Dorado County	10,000
Glen Alpine Springs Company	Aug. 20	Lake Lucille, El Dorado County	10,000
W. W. Price	Aug. 20	Glen Alpine Creek, El Dorado County	7,500
Lawrence & Comstock	Aug. 20	Mountain Top and Velma lakes, El Dorado County	10,000
John P. Fisher	Aug. 27	South Fork American River, El Dorado County	10,000
Lawrence & Comstock	Aug. 31	Little Truckee River and Abe Jewell Creek, El Dorado County	15,000
Mrs. Geo. Farley	Aug. 27	Kelsey Creek, Lake County	10,000
Will R. Horn	Aug. 14	Smoke Creek, Lassen County	5,000
F. D. Hall	Aug. 14	Willow Creek, Lassen County	2,500
Geo. H. Knight	Aug. 14	Upper Ash Creek, Lassen County	5,000
Wm. G. Kerckhoff	Sept. 24	San Antonio Creek, Los Angeles County	20,000
W. J. Sanborn	Sept. 24	Headwaters San Antonio Creek, Los Angeles County	10,000
H. W. O'Melveney	Sept. 30	Devils Canyon, Los Angeles County	10,000
Lagunitas Rod and Gun Club	Aug. 9	Lily Lake, Marin County	5,000
California Anglers' Association	Aug. 9	Lake Lagunitas, Marin County	5,000
Major Wm. T. Littlebrandt	Sept. 18	Echo and East and West Forsyth Pass lakes, Marisopa County	12,500
Yosemite Valley Railway	Sept. 18	Merced River, Mariposa County	17,500
Chas. E. Lethead	Aug. 14	Goose Lake, Modoc County	5,000
Dr. C. M. Tinsman	Aug. 14	Lower Ash Creek, Modoc County	7,500
Walter W. Cochran	Aug. 14	Mill Creek, Modoc County	2,500
Omar Cantrall	Aug. 14	Mill Creek, Modoc County	2,500
L. H. Sisson	Aug. 14	East Creek, Modoc County	2,500
C. W. Williams	Aug. 14	South Fork Pit River, Modoc County	5,000
Jess Parman	Aug. 14	Eagle, Emerson and Rader creeks, Modoc County	5,000
J. H. Bowers	Aug. 14	Joseph Creek, Modoc County	2,500
E. E. Archer	Aug. 14	Shields Creek, Modoc County	5,000
F. M. Rutherford	July 7	Donner and Schafer creeks, Nevada County	20,000
Boca Mill Co.	July 8	Juniper Creek, Nevada County	10,000
W. A. Buckman	July 7	Cold Stream, Nevada County	10,000
Grass Valley Sportsmen's Club	Aug. 31	Squirrel, Woodpecker and Slate creeks, Nevada County	25,000
Sierra Nevada Wood and Lumber Co.	Aug. 31	Prosser Creek, Nevada County	20,000
S. McKay	Sept. 18	Juniper Creek, Nevada County	15,000
H. M. Freeman	July 7	South Yuba River, Placer County	15,000
Joseph Gowling	July 7	North Fork American River, Placer County	15,000
Katherine Chandler	July 8	Five Lakes, Placer County	7,500
C. F. Kohl	Aug. 20	Blackwood Creek, Placer County	5,000
Lake Tahoe Railway and Transportation Co.	Aug. 20	Watson Lake and Ward and Bear Pen creeks, Placer County	20,000
North Fork Association	Aug. 20	Cedar, Onion and Castle creeks, Placer County	10,000
J. C. Scott	Aug. 20	Squaw Creek, Placer County	10,000
J. B. Knapp	Aug. 31	North Fork American River, Placer County	7,500
Geo. P. Kelley	Aug. 31	North Ravine, Placer County	5,000
Dr. Wm. M. Tryon	Aug. 31	Canyon Creek, Placer County	9,000

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF EASTERN BROOK TROUT—Continued.

Applicant	Date	Waters stocked	Number
Frank L. Harmon	Sept. 18	Little Bear River, Placer County	5,000
W. J. McCleary	Oct. 7	Butcher Canyon and American River, Placer County	7,500
D. N. Rogers	July 26	Buck and Mill creeks and Three Lakes, Plumas County	10,000
W. D. Bernheim	July 26	Eureka Lake, Plumas County	10,000
Quincy Chamber of Commerce	Sept. 14	East Branch and Greenhorn Creek, Plumas County	20,000
Strong & Dickinson	Sept. 30	Strawberry and North Fork of San Jacinto creeks, Riverside County	17,500
W. M. Pearce	Sept. 30	Cucamonga Creek, San Bernardino County	5,000
C. L. Watson	July 30	Five Mile Gulch, Shasta County	5,000
Kennett Athletic Club	Sept. 14	Big Backbone Creek, Shasta County	4,500
Mrs. Geo. W. Kenney	July 7	Lake Independence, Sierra County	7,500
F. J. Hunger	July 26	Church Creek, Sierra County	5,000
R. W. Thorne	Aug. 14	Turner, Smith and Badnock creeks, Sierra County	10,000
A. S. Nichols	Sept. 14	Blinman Creek, Sierra County	7,500
D. M. Swobe	Aug. 25	McCloud River, Siskiyou County	30,000
McCloud River Railway	Aug. 30	McCloud River, Siskiyou County	25,000
Wm. J. Bray	Sept. 1	Antelope Creek, Siskiyou County	6,000
R. W. Taylor	Sept. 2	Taylor Creek, Siskiyou County	5,000
Zick Abrams	Sept. 5	Abrams Lake No 2, Siskiyou County	9,000
Robert Rupp	Sept. 26	Sullaway Creek, Siskiyou County	10,000
Chas. Wright	Oct. 1	Cold Creek, Siskiyou County	30,000
California Anglers' Association	Aug. 9	Pole Mountain Creek, Sonoma County	2,500
Geo. Neale	Aug. 8	Battle Creek, Tehama County	12,000
Deer Creek Fish and Game Protective Association	Sept. 10	North and South Deer creeks, Tulare County	10,000
Berry & Cramer	Sept. 10	Peal Creek, Tulare County	5,000
J. B. Curtin	Sept. 14	South Fork Tuolumne River, Tuolumne County	5,000
G. F. Conlin	Sept. 14	South Fork Tuolumne River, Tuolumne County	10,000
L. H. Elliott	Sept. 14	Main Fork Stanislaus River, Tuolumne County	10,000
		Held in ponds at Sisson Hatchery	80,000
		Total	820,500

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF RAINBOW TROUT.

Applicant	Date	Waters stocked	Number
W. H. King	July 26	Flea Valley, Dogwood, Camp and Mill Creeks, Butte County	21,000
B. F. Kauffman	July 30	Feather River, Butte County	12,000
W. J. Whittier	July 30	West Branch of North Fork Feather River, Butte County	12,000
Clay Buchanan	July 30	West Branch of North Fork Feather River, Butte County	12,000
Dr. P. H. Dunbar	July 30	West Branch of Feather River and Kimshew Creek, Butte County	12,000
F. M. Thatcher	July 30	West Branch of Feather River, Butte County	24,000
A. C. Musselman	July 30	Little Butte Creek, Butte County	12,000
H. N. Perry	July 30	Big, Little and Middle Butte creeks, Butte County	18,000
A. J. Stanley	July 30	West Branch of Feather River, Butte County	18,000
J. C. Carter	July 30	Big Creek, Butte County	36,000
Ray D. Head	July 30	Butte Creek, Butte County	24,000
D. E. Roberts	Aug. 27	Esperanza Creek and South and North forks Mokelumne River, Calaveras County	27,000
D. E. Roberts	Sept. 14	San Antone and Mill creeks, Calaveras County	15,000
John P. Fisher	Aug. 27	South Fork American River, El Dorado County	38,000
Mrs. Geo. Farley	Aug. 27	Alder, Nutmeg and Jones creeks, Lake County	12,000
F. D. Hall	Aug. 14	Willow Creek, Lassen County	6,000
F. P. Cady	Aug. 14	Susan River, Lassen County	12,000
Geo. H. Knight	Aug. 14	Upper Ash Creek, Lassen County	6,000
Wm. G. Kerckhoff	Sept. 24	San Antonio Creek, Los Angeles County	10,000
W. J. Sanborn	Sept. 24	Headwaters San Antonio Creek, Los Angeles County	10,000
H. W. O'Melveney	Sept. 30	Main, West and North forks San Gabriel and Cattle Canyon, Los Angeles County	107,500
Geo. E. Little	Sept. 30	Rio Hondo and San Jose, Los Angeles County	10,000
E. D. Silent	Sept. 30	Truinfo Creek, Los Angeles County	5,000
Major Wm. T. Littlebrandt	Sept. 18	Echo and Cathedral lakes and Merced River, Mariposa County	12,500
Yosemite Valley Railway Co.	Sept. 18	Merced River, Mariposa County	20,000
Huffman & Washburn	Sept. 10	Miami Creek, Mariposa County	10,000
Walter W. Cochran	Aug. 14	Mill Creek, Modoc County	6,000
Omar Cantrall	Aug. 14	Mill Creek, Modoc County	6,000
L. H. Sisson	Aug. 14	East Creek, Modoc County	6,000
C. W. Williams	Aug. 14	South Fork Pit River, Modoc County	6,000
Will W. Ahl	Aug. 14	Fitzhugh Creek, Modoc County	12,000
J. H. Bowers	Aug. 14	Joseph Creek, Modoc County	6,000
J. Todd Bonner	Aug. 14	Canyon Creek, Modoc County	6,000
E. E. Archer	Aug. 14	Shields Creek, Modoc County	6,000
J. L. D. Roberts	Sept. 6	Mill and Rocky creeks, Monterey County	12,500
W. B. Tubbs	Aug. 27	Lilly, Mill, Troutdale and Bear creeks, Napa County	18,000
Wm. West	Aug. 27	Milliken Creek, Napa County	75,000
W. L. West	July 7	Yuba River, Nevada County	27,000
F. M. Rutherford	July 7	Donner and Prosser creeks, Nevada County	30,000
Boca Mill Co.	July 8	Little Truckee River, Nevada County	24,000
Nevada City Hunting and Fishing Club	Aug. 19	Rush, Rock and Deer creeks, Nevada County	60,000
W. Thompson	Aug. 19	Poorman and Boroman creeks and Middle Yuba River, Nevada County	12,000
Grass Valley Sportsmen's Club	Aug. 31	Yuba River, Greenhorn, Deer and Rattlesnake creeks, Nevada County	50,000
Sierra Nevada Wood and Lumber Co.	Aug. 31	Prosser Creek, Nevada County	10,000
W. O. Murdoch	Sept. 18	Tributaries of Webber Lake, Nevada County	15,000
San Francisco Fly Casting Club	Oct. 7	Truckee River, Nevada County	15,000
W. M. Avis	Sept. 24	Santa Ana River and tributaries, Orange County	10,000

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF RAINBOW TROUT—Continued.

Applicant	Date	Waters stocked	Number
H. M. Freeman	July 7	South Yuba River, Placer County	24,000
Joseph Gowling	July 7	North Fork American River, Placer County	18,000
Katherine Chandler	July 8	Bear River, Placer County	9,000
Murphy Bros. and Morgan	Aug. 20	Buck Lake, Placer County	9,000
Lake Tahoe Railway and Transportation Co.	Aug. 20	Truckee River, Placer County	24,000
North Fork Association	Aug. 20	North Fork American and South Fork Yuba rivers and Lake Flora, Placer County	21,000
Wm. N. West	Aug. 20	Green Valley Ravine and North Fork American River, Placer County	16,000
Dr. Wm. M. Tryon	Aug. 31	Canyon Creek, Placer County	9,000
G. H. Goodhue	July 23	Indian Creek, Plumas County	18,000
D. N. Rogers	July 26	Bear, Schneider, Big, Clear and Mill creeks, Plumas County	18,000
E. H. Farrar	July 26	Indian Creek, Plumas County	18,000
W. G. Hottman	July 26	Kellog and Mill creeks, Plumas County	24,000
G. N. Johnston	July 26	Smith Creek and Feather River, Plumas County	12,000
Chas. Jones	July 26	Frazier Creek, Plumas County	12,000
W. D. Bernheim	July 26	Jamison Creek, Grass, Wade and Jamison lakes, Plumas County	24,000
W. H. Williamson	July 26	Chipp, Yellow and Mosquito creeks, Plumas County	12,000
Strong & Dickinson	Sept. 30	Strawberry Creek, Riverside County	10,000
Jas. A. Vale	Sept. 24	Lytle, Waterman, Deep and City creeks, San Bernardino County	75,000
W. M. Pearce	Sept. 30	Cucamonga Creek, San Bernardino County	5,000
Ocean Shore Railway Co.	Aug. 3	Purissima Creek, San Mateo County	48,000
H. J. Abels	Sept. 5	Manzana Creek, Santa Barbara County	10,000
C. L. Watson	July 30	Clear Creek, Shasta County	6,000
I. O. Jillson	July 30	Crystal, Clenis and Willow creeks, Shasta County	18,000
Harmon Bell	Aug. 13	Sacramento River, Shasta County	30,000
Dunsmuir Commercial Club	Aug. 24	Soda, Big Castle, Flume, Mears, Hazel, and Shotgun creeks, Shasta County	32,500
Kennett Athletic Club	Sept. 14	Big Backbone Creek, Shasta County	4,500
Mrs. Geo. W. Kenney	July 7	Lake Independence, Sierra County	12,000
F. J. Hunger	July 26	Sulma Creek, Sierra County	6,000
A. H. Walton	July 26	North and South forks Yuba River, Sierra County	18,000
A. S. Nichols	Sept. 14	Cool and Miller creeks, Sierra County	7,500
A. P. Wright	July 22	Mt. Eddy Lakes, Siskiyou County	3,000
O. E. Pile	Aug. 23	Butte Creek, Siskiyou County	12,000
Dunsmuir Commercial Club	Aug. 24	Little Castle Creek, Siskiyou County	17,500
D. M. Swobe	Aug. 25	Mouth of Dry Creek, Siskiyou County	30,000
McCloud River Railway	Aug. 30	McCloud River, Siskiyou County	12,500
Wm. J. Bray	Sept. 1	Antelope Creek, Siskiyou County	9,000
Ed F. Jared	Sept. 2	Shasta River, Siskiyou County	7,500
W. E. Tebbe	Sept. 19	Salmon River, Siskiyou County	2,000
J. H. Hoerl	Sept. 28	Sullaway Creek, Siskiyou County	5,000
W. E. Tebbe	Oct. 9	South and Main branches Etna Creek, Siskiyou County	5,000
Geo. Neale	Aug. 8	Mill Creek, Tehama County	6,000
Bly & Wooley	Aug. 13	Mill Creek, Tehama County	18,000
E. C. Powell	Aug. 13	Antelope Creek, Tehama County	18,000
C. E. Carr	July 30	East Fork Lake, Trinity County	18,000
Elias Ellery	Sept. 18	Swift Creek, Trinity County	12,000
Porterville Fish and Game Association	Sept. 10	Redwood and Jennie creeks, Kessing branch and North Fork Tule River, Tulare County	25,000
Tule River Shooting and Fishing Club	Sept. 10	Casy and Belknap creeks and Tule River, Tulare County	15,000

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF RAINBOW TROUT—Continued.

Applicant	Date	Waters stocked	Number
Widgeon Gun Club	Sept. 10	Upper South Fork Kaweah River, Tulare County	22,500
Deer Creek Fish and Game Protective Association	Sept. 10	North and South Deer creeks, Tulare County	10,000
Berry & Cramer	Sept. 10	Poso Creek, Tulare County	5,000
D. E. Roberts	Sept. 14	North Fork Stanislaus River, Tuolumne County	7,500
J. B. Curtin	Sept. 14	South Fork Tuolumne River, Tuolumne County	10,000
G. F. Conlin	Sept. 14	South Fork Stanislaus River, Tuolumne County	12,500
L. H. Elliott	Sept. 14	Main Fork Stanislaus River, Tuolumne County	10,000
J. A. Rasmussen	Sept. 24	Conejo and Tapo creeks and Ventura River, Ventura County	20,000
W. E. Sullivan	Sept. 24	Agua Blanca, Ventura County	10,000
F. D. Silent	Sept. 30	Truinfo Creek, branch of Malibu, Ventura County	5,000
Fillmore Chamber of Commerce	Sept. 30	Sespe Creek, Ventura County	10,000
		Held in ponds, Sisson hatchery	70,500
		Total	2,073,500

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF STEELHEAD TROUT.

Applicant	Date	Waters stocked	Number
Lagunitas Rod and Gun Club	Aug. 9	Lagunitas, Swede George and Cataract creeks, Marin County	30,000
California Anglers' Association	Aug. 9	Lake Lagunitas, Oema and Paper Mill creeks, Marin County	120,000
California Anglers' Association	Sept. 5	Lake Lagunitas, Redwood Canyon, Steep Ravine, Lagunitas and Bolinas creeks, Marin County	65,000
California Western Railway and Navigation Co.	July 14	Main, North Fork and Little North Fork Noyo River, Burlick, Redwood, Alpine and Pudding creeks, Mendocino County	300,000
Geo. L. Hamer	July 21	North Mill Creek, Mendocino County	24,000
B. J. Reilly	July 21	Redwood and Elder creeks, Mendocino County	24,000
Mendocino State Hospital	July 21	South Mill Creek, Mendocino County	24,000
John L. Orr	July 21	South Fork Big River, Mendocino County	24,000
B. H. Miller	July 21	Robertson Creek, Mendocino County	30,000
Dr. C. O. Edwards	July 21	Indian Creek and Navaro River, Mendocino County	36,000
E. L. Waldteufel	July 21	Jack Smith Creek, Mendocino County	24,000
G. A. Johnson	July 21	Cole Creek, Mendocino County	30,000
C. N. Cox	July 21	Orr Creek, Mendocino County	30,000
W. O. White	July 21	Reeves Mill Creek, Mendocino County	30,000
E. E. Holbrook	July 21	East Branch Russian River, Mendocino County	24,000
J. L. D. Roberts	Sept. 6	Big and Little Sur and Carmel River, Monterey County	62,500
Clyde H. Drake	Aug. 27	Ritchie Creek, Napa County	36,000
Wm. West	Aug. 27	Napa Creek, Napa County	57,000
Ocean Shore Railway	Aug. 3	Lobitos and Tunitas creeks, San Mateo County	117,000
H. J. Abels	Sept. 5	Sisquoc and Santa Ynez, Santa Barbara County	25,000
I. L. Koppel	Aug. 2	Penetentia, Stevens, Almaden, Smiths, Campbell and Los Gatos creeks, Santa Clara County	135,000
I. L. Koppel	Sept. 5	Los Gatos and tributaries, Almaden, Ysabel and Campbell creeks, Santa Clara County	50,000
California Anglers' Association	Aug. 9	Austin, Ward, Graham Canyon, Sonoma and Hooker creeks, Sonoma County	93,000
		Total	1,390,500

SISSON HATCHERY—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF BLACK SPOTTED TROUT.

Applicant	Date	Waters stocked	Number
T. F. Dunnaway	Aug. 14	Goose Lake, Modoc County	12,000
A. P. Wright	July 22	Mt. Eddy Lakes, Siskiyou County	3,000
Walker & Barnum	Oct. 9	Mill, French, Kelsey and Etna creeks, Siskiyou County	24,000
Fish and Game Commission	Oct. 21	Schoolhouse Spring Creek, Siskiyou County	29,000
H. E. Stock	Sept. 18	Twin Lakes, Trinity County	24,000
		Total	92,000

Landlocked salmon retained in ponds at Sisson hatchery	7,835
Grayling retained in ponds at Sisson hatchery	40,000

TAHOE HATCHERIES.

Fish Distribution, Season 1913.

DISTRIBUTION OF BLACK SPOTTED TROUT—Continued.

Applicant	Date	Waters stocked	Number
Lawrence & Comstock	June 30	Tallac and Taylor creeks, El Dorado County	80,000
Glen Alpine County	July 1	Susie Lake, El Dorado County	40,000
Glen Alpine County	July 2	Half Moon Lake, El Dorado County	40,000
Glen Alpine County	July 3	Grass Lake, El Dorado County	40,000
Glen Alpine County	July 7	Heather Lake, El Dorado County	40,000
Lawrence & Comstock	July 7	Taylor Creek, El Dorado County	50,000
Lawrence & Comstock	July 8	Taylor Creek and Power House Ditch, El Dorado County	84,690
Lawrence & Comstock	July 9	Green Bay, Fallen Leaf Lake and Cascade Lake, El Dorado County	100,000
Lawrence & Comstock	July 10	Taylor and Tallac creeks, El Dorado County	66,300
Bert Ganley	July 10	Little Truckee River, El Dorado County	50,000
Lawrence & Comstock	July 12	Cascade Lake, El Dorado County	50,000
Lawrence & Comstock	July 14	Tallac Creek and Green Bay, Fallen Leaf Lake, El Dorado County	100,000
Lawrence & Comstock	July 16	Tallac and Taylor creeks, El Dorado County	67,795
Lawrence & Comstock	July 17	Tallac Creek, El Dorado County	50,000
Lawrence & Comstock	July 18	Taylor Creek, El Dorado County	50,000
Lawrence & Comstock	July 21	Tallac and Taylor creeks and Green Bay, Fallen Leaf Lake, El Dorado County	185,000
Lawrence & Comstock	July 22	Power House Ditch, El Dorado County	61,350
Chas. Cello	Sept. 27	Grass Lake, El Dorado County	3,000
Jas. Bryson	Sept. 27	Echo Lake, El Dorado County	40,000
H. E. Wilson	Aug. 5	Donner Lake, Nevada County	32,000
H. E. Wilson	Aug. 6	Donner Lake, Nevada County	35,000
F. M. Rutherford	Sept. 9	Summit Lake, Nevada County	12,000
M. J. Rutherford	Sept. 22	Frog Lake, Nevada County	12,000
Fish and Game Com.	Aug. 1	Slim Jim and Ward creeks and Truckee River, Placer County	135,000
Fish and Game Com.	Aug. 2	Blackwood Creek, Placer County	60,000
Fish and Game Com.	Aug. 19	Slim Jim Creek, Placer County	60,000
H. M. Freeman	Aug. 21	Stirling Lake and lakes adjoining, Placer County	30,000
H. M. Freeman	Aug. 23	Fordyce Creek, Placer County	28,030
Fish and Game Com.	Aug. 31	Burton Creek, Placer County	7,355
Fish and Game Com.	Sept. 12	Blackwood Creek, Placer County	20,000
Fish and Game Com.	Sept. 17	Ward and Blackwood creeks, Placer County	60,000
Fish and Game Com.	Sept. 18	Slim Jim Creek, Placer County	50,000
S. J. Boughman	Sept. 22	Buck Lake, Placer County	18,000
Murphy Bros. & Morgan	Sept. 24	Hank Richardson and Miller lakes, Placer County	30,000
Chas. Paine	Sept. 24	Griffin Creek, Placer County	28,460
Murphy Bros. & Morgan	Sept. 26	Miller Lake, Placer County	27,000
Murphy Bros. & Morgan	Sept. 29	McKinney Creek, Placer County	18,000
Albert Caldwell	Sept. 29	Little Rock Bound Lake, Placer County	3,540
Mrs. Kenny	Aug. 8	Independence Lake, Sierra County	40,000
Wm. C. Murdoch	Aug. 23	Webber Lake, Sierra County	12,000
Wm. C. Murdoch	Aug. 24	Webber Lake, Sierra County	15,000
Wm. C. Murdoch	Aug. 29	Webber Lake, Sierra County	15,000
Wm. C. Murdoch	Sept. 9	Webber Lake, Sierra County	15,000
		Total	1,961,520

TAHOE HATCHERIES—Continued.

Fish Distribution, Season 1913.

DISTRIBUTION OF LARGE LAKE TROUT.

Applicant	Date	Waters stocked	Number
Lawrence & Comstock	July 25	Power House Ditch, El Dorado County	9,887
Lawrence & Comstock	July 25	Tallac Creek, El Dorado County	11,079
C. A. Swisler	Sept. 15	Echo Lake, El Dorado County	8,000
F. M. Rutherford	Sept. 9	Summit Lake, Nevada County	4,000
M. J. Rutherford	Sept. 22	Frog Lake, Nevada County	4,183
H. M. Freeman	Aug. 23	Stirling Lake and lakes adjoining, Placer County	8,000
Wm. C. Murdoch	Aug. 23	Webber Lake, Sierra County	12,000
Wm. C. Murdoch	Aug. 24	Webber Lake, Sierra County	12,000
Wm. C. Murdoch	Aug. 29	Webber Lake, Sierra County	12,000
Wm. C. Murdoch	Sept. 9	Webber Lake, Sierra County	6,000
		Total	87,149

DISTRIBUTION OF RAINBOW TROUT.

Applicant	Date	Waters stocked	Number
Glen Alpine Company	July 26	Susie and Half Moon lakes and Glen Alpine Creek, El Dorado County	12,500
Lawrence & Comstock	July 27	Cascade Lake, El Dorado County	20,000
Bert Gandlee	July 29	Cold Stream, El Dorado County	5,000
Fish and Game Com.	July 31	Truckee River, Placer County	10,718
		Total	48,218

DISTRIBUTION OF EASTERN BROOK TROUT.

Applicant	Date	Waters stocked	Number
Frank Pomin	Sept. 15	Meeks Creek, El Dorado County	5,000
Albert Caldwell	Sept. 15	Little Rock Bound Lake, Placer County	5,000
Lake Tahoe Railway and Transportation Co.	Sept. 17	Ward Creek, Placer County	3,000
Chas. Paine	Sept. 24	Griffin Creek, Placer County	5,000
Lake Tahoe Railway and Transportation Co.	Sept. 28	Blackwood Creek, Placer County	2,000
Albert Caldwell	Sept. 29	Little Rock Bound Lake, Placer County	2,850
		Total	22,850

BROOKDALE HATCHERY.

Fish Distribution, Season 1913.

DISTRIBUTION OF STEELHEAD TROUT.

Applicant	Date	Waters stocked	Number
Santa Cruz County	Apr. 25	Mill Creek, Santa Cruz County	2,000
Santa Cruz County	May 8	Wilder, Baldwin, Laguna and Majors creeks, Santa Cruz County	20,000
Santa Cruz County	May 9	Corralitos and Browns creeks, Santa Cruz County	12,000
Santa Cruz County	May 12	Hazel Dell Creek, Santa Cruz County	11,000
Santa Cruz County	May 13	Middle Fork Corralitos Creek, Santa Cruz County	11,000
Santa Cruz County	May 14	Headwaters Soquel Creek, Santa Cruz County	10,000
Santa Cruz County	May 15	Corralitos and Blackburn creeks, Santa Cruz County	12,000
Santa Cruz County	May 16	Soquel Creek, Santa Cruz County	10,000
Santa Cruz County	May 17	McGrath Creek, Santa Cruz County	9,000
Santa Cruz County	May 21	Scott Creek, Santa Cruz County	6,000
Santa Cruz County	May 26	Lidell, Yellow Bank, Molino and Mill creeks, Santa Cruz County	20,000
Santa Cruz County	May 27	Branciforte and Soquel creeks, Santa Cruz County	16,000
Santa Cruz County	May 31	Soquel Creek, Santa Cruz County	20,000
Santa Cruz County	June 6	San Lorenzo River and Boulder Creek, Santa Cruz County	30,000
Santa Cruz County	June 7	Soquel Creek, San Lorenzo River and Boulder Creek, Santa Cruz County	46,000
Santa Cruz County	June 11	Aptos and Kings creeks, Santa Cruz County	33,000
Santa Cruz County	June 12	San Lorenzo River, Santa Cruz County	42,000
Santa Cruz County	June 13	Soquel and Bear creeks, Santa Cruz County	31,000
Santa Cruz County	June 14	Fall and Zayante creeks, Santa Cruz County	21,000
Santa Cruz County	June 17	Bean Creek, Santa Cruz County	12,000
Santa Cruz County	June 18	Wadell Creek, Santa Cruz County	12,000
Santa Cruz County	June 19	Wadell and Laguna creeks, Santa Cruz County	18,000
Santa Cruz County	June 22	Zayante Creek, Santa Cruz County	10,000
Santa Cruz County	June 23	Zayante and Gold Gulch creeks, Santa Cruz County	10,000
Santa Cruz County	June 25	Wadell Creek, Santa Cruz County	12,000
Santa Cruz County	June 26	Shingle Mill Creek, Santa Cruz County	2,000
Santa Cruz County	June 28	Scott Creek, Santa Cruz County	15,000
Santa Cruz County	July 1	San Lorenzo River, Santa Cruz County	12,000
Santa Cruz County	July 2	San Lorenzo River, Santa Cruz County	9,000
Santa Cruz County	July 8	Zayante Creek, Santa Cruz County	12,000
Santa Cruz County	July 9	San Lorenzo River and Bear Creek, Santa Cruz County	26,000
Santa Cruz County	July 12	Fall Creek, Santa Cruz County	12,000
Santa Cruz County	July 26	Zayante Creek, Santa Cruz County	11,000
Santa Cruz County	Aug. 18	San Lorenzo River, Santa Cruz County	10,000
Santa Cruz County	Aug. 20	San Lorenzo River, Santa Cruz County	2,000
Santa Cruz County	Aug. 29	San Lorenzo River, Santa Cruz County	10,000
Santa Cruz County	Sept. 3	City Reservoir, Santa Cruz County	4,000
Santa Cruz County	Sept. 6	Fall Creek, Santa Cruz County	2,000
Santa Cruz County	Oct. 5	Shingle Mill Creek, Santa Cruz County	11,000
Santa Cruz County	Oct. 30	San Lorenzo River, Santa Cruz County	19,000
		Total	593,000

DISTRIBUTION OF QUINNAT SALMON.

Fish and Game Com	July 1	San Lorenzo River, Santa Cruz County	294,660

DISTRIBUTION OF SILVER SALMON.

Fish and Game Com	July 15	Scott Creek, Santa Cruz County	25,000

PRICE CREEK HATCHERY.

Fish Distribution, Season 1913.

DISTRIBUTION OF QUINNAT SALMON.

Applicant	Date	Waters stocked	Number
Fish and Game Com.	Mar. 8	Mad River, Humboldt County	100,000
Fish and Game Com.	Mar.6-10	Price Creek, tributary to Eel River, Humboldt County	1,386,500
		Total	1,486,500

SACRAMENTO EXPERIMENTAL STATION.

Fish Distribution, Season of 1913.

DISTRIBUTION OF QUINNAT SALMON.

Applicant	Date	Waters stocked	Number
Fish and Game Com.	Jan. 31	Sacramento River, Sacramento County	359,000

WAWONA HATCHERY.

Fish Distribution, Season 1913.

DISTRIBUTION OF BLACK SPOTTED TROUT.

Applicant	Date	Waters stocked	Number
Fish and Game Com.	July 26	Merced River, Meadow and Chilnoquina creeks, Mariposa County	39,000
Fish and Game Com.	July 27	Merced River, Mariposa County	16,000
Alanzo Wright	July 27	Bigtree Creek, Mariposa County	6,000
J. Washburn	July 28	Chilnoquina Creek, Mariposa County	15,000
J. Washburn	July 29	Bruce Creek, Mariposa County	8.000
J. Washburn	July 30	Merced River, Mariposa County	25,000
J. Washburn	Aug. 2	Meadow Creek, Mariposa County	15,000
J. Washburn	Aug. 4	Big and Laurel creeks, Mariposa County	24,000
J. Washburn	Aug. 5	Merced River, Squirrel and Rush creeks, Mariposa County	30,000
Alanzo Wright	July 27	Big and Ranier creeks, Madera County	24,000
Alanzo Wright	July 28	Hogue and Thompson creeks, Madera County	18,000
		Total	220,000

Following is a summary of the distribution from the different hatcheries for the season of 1913:

SISSON HATCHERY.

Species	Eggs	Loss	Shipped to other stations	Fry shipped and held for breeding	Total shipped and held for breeding
Loch Leven trout	1,352,520	220,020	------------	1,132,500	
Eastern brook trout	990,800	170,300	------------	820,500	
Rainbow trout	2,276,040	92,640	110,000	2,073,500	
Steelhead trout	1,586,000	195,500	------------	1,390,500	
Black spotted trout	100,000	8,000	------------	92,000	
Grayling	50,000	10,000	------------	40,000	
Landlocked salmon	10,000	2,165	------------	7,835	5,556,835
Quinnat salmon	14,547,548	410,481	------------	14,137,067	14,137,067
					19,693,902

TAHOE HATCHERIES.

Black spotted trout	2,500,260	198,740	340,000	1,961,520	
Large lake trout	115,760	28,611	------------	87,149	
Rainbow trout	50,000	1,782	------------	48,218	
Eastern brook trout	23,000	150	------------	22,850	2,119,737

BROOKDALE HATCHERY.

Steelhead trout	2,556,600	366,600	1,597,000	593,000	
Quinnat salmon	300,000	5,340	------------	294,660	
Silver salmon	90,200	65,200	------------	25,000	912,660

PRICE CREEK HATCHERY.

Quinnat salmon	1,500,000	13,500	------------	1,486,500	1,486,500

SACRAMENTO EXPERIMENTAL STATION.

Quinnat salmon	600,000	241,000	------------	359,000	359,000

WAWONA HATCHERY.

Black spotted trout	240,000	20,000	------------	220,000	220,000
Total	------------	------------	------------	------------	24,791,799

SISSON HATCHERY.

Fish Distribution, Season of 1914.

DISTRIBUTION OF QUINNAT SALMON.

Date	Waters stocked	Number
Mar. 2	Cold Creek, tributary to Sacramento River, Siskiyou County	1,500,000
Mar. 15	Cold Creek, tributary to Sacramento River, Siskiyou County	750,000
Apr. 1	Sullaway Creek, tributary to Sacramento River, Siskiyou County	1,150,000
Apr. 1	Cold Creek, tributary to Sacramento River, Siskiyou County	350,000
Apr. 2	Cold Creek, tributary to Sacramento River, Siskiyou County	550,000
Apr. 2	Straits of Carquinez, Solano County	350,000
Apr. 2	Sullaway Creek, tributary to Sacramento River, Siskiyou County	800,000
Apr. 3	Cold Creek, tributary to Sacramento River, Siskiyou County	150,000
Apr. 4	Cold Creek, tributary to Sacramento River, Siskiyou County	2,450,000
Apr. 4	Sullaway Creek, tributary to Sacramento River, Siskiyou County	850,000
Apr. 5	Klamath River, Siskiyou County	330,000
Apr. 7	Klamath River, Siskiyou County	350,000
Apr. 13	Straits of Carquinez, Solano County	335,000
Apr. 16	Sullaway Creek, tributary to Sacramento River, Siskiyou County	400,000
Apr. 16	Klamath River, Siskiyou County	335,000
Apr. 18	Klamath River, Siskiyou County	335,000
Apr. 19	Cold Creek, tributary to Sacramento River, Siskiyou County	277,500
Apr. 19	Straits of Carquinez, Solano County	315,000
Apr. 24	Straits of Carquinez, Solano County	330,000
Apr. 27	Sacramento River, Sacramento County	335,000
Apr. 28	Cold Creek, tributary to Sacramento River, Siskiyou County	2,700,000
Apr. 29	Cold Creek, tributary to Sacramento River, Siskiyou County	300,000
Apr. 30	Cold Creek, tributary to Sacramento River, Siskiyou County	363,000
May 1	Smiths River, Del Norte County	100,000
May 4	Straits of Carquinez, Solano County	330,000
May 5	Spring Creek, tributary to Sacramento River, Siskiyou County	200,000
May 6	Spring Creek, tributary to Sacramento River, Siskiyou County	400,000
May 7	Sullaway Creek, tributary to Sacramento River, Siskiyou County	200,000
May 22	Cold Creek, tributary to Sacramento River, Siskiyou County	139,115
May 25	Cold Creek, tributary to Sacramento River, Siskiyou County	800,000
	*Retained in Klinks Lake, Sisson hatchery	1,900,000
	*Retained in Sisson Lake, Sisson hatchery	2,100,000
	Total	21,294,615

*Fish retained in Klinks and Sisson lakes at Sisson hatchery are being fed until fall, when they will be released in the Sacramento River, in Siskiyou County.

DISTRIBUTION OF SILVER SALMON.

Date	Waters stocked	Number
Apr. 5	Klamath River, Siskiyou County	12,500

PRICE CREEK HATCHERY.

Fish Distribution, Season of 1914.

DISTRIBUTION OF QUINNAT SALMON.

Applicant	Date	Waters stocked	Number
Fish and Game Commission	Feb. 7	Price Creek, Humboldt County	100,000
Fish and Game Commission	Feb. 9	Price Creek, Humboldt County	155,000
Fish and Game Commission	Feb. 10	Price Creek, Humboldt County	120,000
Fish and Game Commission	Feb. 11	Eel River, Humboldt County	210,000
Fish and Game Commission	Feb. 13	Eel River, Humboldt County	183,000
Fish and Game Commission	Feb. 14	Eel River, Humboldt County	240,000
Fish and Game Commission	Feb. 15	Eel River, Humboldt County	220,000
Fish and Game Commission	Feb. 16	Eel River, Humboldt County	170,000
Fish and Game Commission	Feb. 18	Price Creek, Humboldt County	280,000
Fish and Game Commission	Feb 19	Price Creek, Humboldt County	200,000
Fish and Game Commission	Feb. 20	Price Creek, Humboldt County	400,000
Fish and Game Commission	Feb. 26	Price Creek, Humboldt County	100,000
Fish and Game Commission	Mar. 6	Price Creek, Humboldt County	42,610
Fish and Game Commission	Mar. 7	Price Creek, Humboldt County	100,000
Fish and Game Commission	Mar. 8	Price Creek, Humboldt County	167,850
Fish and Game Commission	Mar. 9	Price Creek, Humboldt County	26,305
Fish and Game Commission	Mar. 10	Price Creek, Humboldt County	27,235
Fish and Game Commission	Mar. 10	Eel River, Humboldt County	140,000
Arcata Chamber of Commerce	Mar. 27	Mad River, Humboldt County	75,000
Harbor Commissioners, Port of Eureka	Mar. 31	Freshwater Creek, tributary to Humboldt Bay, Humboldt County	37,500
Eureka Chamber of Commerce	Mar. 31	Jacoby Creek, tributary to Humboldt Bay, Humboldt County	37,500
Arcata Chamber of Commerce	Apr. 4	Mad River, Humboldt County	75,000
Arcata Chamber of Commerce	Apr. 7	Mad River, Humboldt County	75,000
Fish and Game Commission	Apr. 10	Eel River, Humboldt County	691,000
Eureka Chamber of Commerce	Apr. 10	Elk River, tributary to Humboldt Bay, Humboldt County	75,000
		Total	3,948,000

Following is a summary of the number of fish eggs taken and the number of fry which would be available for distribution during the season of 1914:

SISSON HATCHERY.

Species	Eggs	Loss estimated	Shipped to other stations	Available for distribution estimated	Total available for distribution estimated
Loch Leven trout	1,818,840	144,840		1,674,000	
Eastern brook trout	1,169,750	116,750		1,053,000	
Rainbow trout	1,101,850	44,850		1,057,000	
Steelhead trout	2,250,000	121,000		2,250,000	
Black spotted trout	1,910,000	130,000		1,780,000	
Large lake trout	20,000	2,000		18,000	7,832,000
Quinnat salmon	21,702,645	408,030		21,294,615	
Silver salmon	95,840	3,340	80,000	12,500	21,307,115
Total					29,139,115

TAHOE HATCHERIES.

Species	Eggs	Loss estimated	Shipped to other stations	Available for distribution estimated	Total available for distribution estimated
Black spotted trout	5,336,100	326,100	2,128,000	2,882,000	
Large lake trout	212,800	53,200	44,600	95,000	2,977,000

PRICE CREEK HATCHERY.

Species	Eggs	Loss estimated	Shipped to other stations	Available for distribution estimated	Total available for distribution estimated
Steelhead trout	410,000	4,000		406,000	
Quinnat salmon	4,083,250	135,250		3,948,000	4,354,000

UKIAH HATCHERY AND SNOW MOUNTAIN EGG COLLECTING STATION.

Species	Eggs	Loss estimated	Shipped to other stations	Available for distribution estimated	Total available for distribution estimated
Steelhead trout	1,813,480	382,480	881,000	550,000	550,000

WAWONA HATCHERY.

Species	Eggs	Loss estimated	Shipped to other stations	Available for distribution estimated	Total available for distribution estimated
Black spotted trout	218,000	18,000		200,000	
Large lake trout	24,600	2,600		22,000	222,000
Total					37,242,115

REPORT OF SUPERINTENDENT OF GAME FARM.

By W. N. Dirks.

The scarcity of wild game, and the demand that there is from the non-hunting public for something to take the place of the game that was formerly commonly served at all hotels and resorts throughout our state, has opened up a new field for the pheasant breeder. The ringneck pheasant is not only one of the best of game birds, but also takes very kindly to domestication and can be reared by careful breeders with scarcely more difficulty than ordinary poultry. The prices that are obtained for young pheasants has made the breeding of pheasants very attractive to many people throughout the state, and in time should be an important addition to its industries. In the hope that the experience we have gained at the state game farm during the past several years may be of benefit to the public, we offer a few suggestions for the handling of pheasants and other game birds in confinement.

Since the inception of the game farm, approximately five thousand pheasants have been raised. Most of these have been liberated in the various parts of the state climatically adapted to them. It has not been the intention of the commission to enter into competition with private breeders and practically no birds have been sold.

Selecting of Breeding Stock.

It has been our practice to hold the largest and most vigorous birds from the early hatch for breeders the following year. These birds seem to be stronger in every way than those from hatches later in the season. It is well to exchange birds with other parties having a different strain of stock to prevent any evil effects that might arise from inbreeding.

Breeding Pens.

As the breeding birds will be held for approximately five months during the laying season, it is essential that they be placed in pens that can be easily moved to new ground. Very satisfactory pens can be built of equal size panels covered with inch mesh wire and secured at the corners with butterfly bolts. A baseboard at least a foot high on each panel will add strength and durability to the pens. In the corner of one panel a door large enough to admit the entrance of the attendant should be constructed. Panels can be placed across the top, or poultry wire can be stretched and fastened temporarily. A pen of six birds should have a ground space of at least 144 square feet. The takedown pens have the additional advantage that they can be segregated should there be any need of keeping the birds apart on account of disease. They can also be easily cleaned and disinfected.

Feed for Breeding Stock.

Any standard brand of poultry scratch feed, together with plenty of greens, grit and dust will be found satisfactory. Over feeding is to be guarded against, and the pens should never be littered with stale food. An abundance of fresh water should be available at all times.

Breeding Season.

The breeding stock should be placed in their allotted pens by the first of February, or as soon as they show any inclination to mate. In our experience, we have found that the best results can be obtained from confining not to exceed five hens with each male bird, although good results can sometimes be obtained by using a greater number of hens; but under average conditions this is not advisable. Eggs may be expected by the middle of March. Between this time and the middle of July, each hen should lay approximately sixty eggs. These eggs should be gathered twice a day and placed in a cool, well ventilated room on shelves covered with a half inch of sand to prevent them from rolling about. In order to avoid the confusion of having several small hatches coming off every few days, we make a practice of setting every ten or twelve days. This permits us to give our entire attention to one lot of young birds during the most critical period, namely, the first ten days. We have found that holding the eggs for this length of time is not detrimental in any way. It should be remembered that in the wild state the hen pheasant will lay an egg a day over a period of from two to three weeks. She does not commence to set until the last egg is laid, and almost invariably every egg will hatch.

Setting.

Our experience with the incubator has proven to our satisfaction that the domestic chicken or turkey is preferable. We have had excellent results from combining both. Eggs have been placed under hens for the first half of the period of incubation and then tested for fertility and the fertile eggs transferred to the incubator. As the eggs are taken from the hens, they are placed in a basket and the hens are then reset on fresh eggs. The number of eggs given each hen is governed by the ability of the hen to cover them satisfactorily. When setters are scarce, we ordinarily place as many as twenty-five under each hen. Bantams will cover only fifteen and a hen turkey will cover satisfactorily as many as thirty-five.

Eight hens are placed in one compartment, the nests being on the ground and separated by a four-inch board. By this arrangement only one drinking fountain is necessary. There is also a reduction in the number of feed pans, dust boxes, etc., and the extra work in attending to them. It is necessary, however, for the attendant to keep careful watch to see that the setting hens do not "double up," thereby leaving a setting of eggs uncovered, so that they become chilled.

Great care should be taken in the selection of the brooding hens. No birds should be selected that can not be handled. Nervous, easily frightened birds will fly off the nest at the approach of the attendant and will destroy more eggs than the hen is worth. Before setting, the hen should be free of all vermin, and only healthy fowls should be selected.

Incubation.

Pheasant eggs are tested for fertility in the same manner as the ordinary hen egg. The fertile eggs are placed in the incubator for the remaining period of incubation, and the infertile ones can be set aside to be used later for food for the young chicks. The incubating period varies between twenty-three to twenty-four days. We have used California made incubators equipped with moisture pans kept partially full of water during the entire season. The bulb of the thermometer is placed even with the top of the eggs, the temperature registering from 101 to 103 degrees Fahrenheit. We have found that the temperature can vary to a considerable extent without any serious results in the hatch. Eggs should be allowed to cool in the morning and evening up to the time of hatch. While most lots of eggs are moved or scrambled about at each cooling, we have had the same percentage of hatches from

Two bird-killers—house cat and weasel.

lots that have not been turned at all during the period of time while in the incubators.

Brooding.

During the season of 1912-13, all birds, with the exception of a few small lots whose numbers did not warrant the expense of operating artificial brooders, were brooded in brooders of various makes. The fireless brooder equipped with feather dusters gave excellent satisfaction with small lots, but scores of birds were confined together and a large number were lost through piling up. One of the chief objections to this style of brooder is the fact that the chicks must be forced in, there being no artificial heat to attract them. When there are many birds to be taken care of, it has been found more satisfactory to use a brooder with artificial heat. There are various makes of oil heaters on the market, all of which should give good results.

During the season of 1914, owing to uncertainty as to whether the game farm would be permanently maintained, we have only a very small breeding stock and are using hens exclusively for brooders. When this is done, it is absolutely essential that they be cleaned of all vermin, as nothing is more fatal to the pheasant chicks than vermin. Large. clumsy hens are to be condemned, as they kill many chicks by stepping on them.

As soon as the chicks are thoroughly dry, they are placed in baskets and given to the hens that are to take care of them. A close watch is kept to see that they are adopted, after which each family is transferred to its individual brooding coop. Some hens will show a positive dislike towards caring for the chicks. Such hens should be reset and not given the young birds until they will take care of them.

The brooding coops are constructed of twelve-inch redwood boards, with a shed roof on one end to afford shelter at night. The open portion should be covered with poultry wire of small enough mesh so that the young birds can not get out. The brooding pens are open at the bottom and are transferred to fresh ground from day to day. If confined to the same place for any length of time, the birds will quickly become weakened and not be able to withstand disease. Water is an essential requirement and a clean supply should be available at all times. Several makes of excellent chick fountains can be purchased. When the coops are set on grass plots, it is not necessary to feed other greens, otherwise lettuce, kale, or Swiss chard or some other greens should be given every day. We feed a standard variety of chick food, mixed with ground hard boiled eggs, in the proportion of twelve eggs to one gallon of food. This preparation is given for about two weeks, and then gradually cut down until the birds are eating straight feed at three weeks of age. In addition to this, we feed dried house flies freely. They are trapped in wire fly traps and roasted and put in the sun to dry.

Maggots make an ideal, economical food that is readily taken by the young birds and is highly recommended by all pheasant breeders. Maggots can be reared without any great amount of trouble, by placing meat in a box, one end of which has been replaced by inch mesh wire. The box should be raised a foot from the ground and underneath the wire should be placed a bucket or tub, the bottom of which is covered with an inch of dry bran. The meat will quickly become "fly blown" and thoroughly infested with maggots. As they reach maturity, they will drop from the open end of the box into the bran of the bucket, where they dry off and can be fed to the young birds. A number of these maggot "factories" can be started at intervals, so as to maintain a constant supply of food.

A small box of sand or dust is kept in each coop, in which the chicks may dust themselves, thus keeping down any vermin that may not have been destroyed. The chicks should be confined in these coops until they are at least three weeks old. When moved to a larger pen, if the hen shows any tendency to neglect the chicks, they should be put back in the smaller pen until large enough to get along without her care. From the brooding pens, we have found it wise to put the flock in pens similar to those in which the breeding stock has been confined.

Shelter should be arranged so that the birds may during the stormy weather in the winter, if they desire, get under cover. A strip of roofing paper or oil canvas stretched over part of the top and along the upper part of the back of a series of pens will make an ideal shelter. Underneath this, perches or roosts can be constructed. The growing birds can be fed the regular poultry scratch food alternated with whole corn.

Valley Quail.

We have carried on during the past two years a number of experiments in the breeding of valley quail. During the season of 1913, part of our breeding stock was confined in pens similar to the pheasant pens, five females with one male. The others were held in a large enclosure. While the number of eggs secured was practically the same per bird in both lots, the fertility was somewhat better in those taken from the larger pen.

During the season of 1914, all of the quail have been confined in one cage, the eggs gathered day by day and held in the same manner as the pheasant eggs; in fact, with the exception of the incubation, the eggs and young quail are handled in exactly the same manner as the pheasants.

The period of incubation varies between twenty-three to twenty-four days. The water pan is kept full during the entire period, thus maintaining an equal amount of humidity during the entire period. The temperature may vary a number of degrees, some incubators registering at times as high as 105 degrees.

Quiet, bantam hens make excellent setters and brooders and where the number of eggs does not warrant the use of an incubator, they can be depended upon to hatch every fertile egg. On the twenty-second day of incubation, the hen should be confined in such a way that it will be absolutely impossible for the young birds to stray more than a few inches from the nest; otherwise they will go so far that they will not be able to find their way back, not understanding the cluck of the hen. At this time they need the heat that they secure from the mother hen and quickly die if chilled. Care should be taken that all holes are closed, as the young quail can make their way through an exceedingly small opening. After the young quail are thoroughly dry, they may be moved with the hen to the brooding coop, as illustrated in an accompanying cut. We have not found an artificial brooder that can compare in results secured with the ordinary hen.

Hen with brood of young valley quail at State Game Farm.

The chicks should remain with the hen until fully grown, but should be moved at about six weeks of age to larger pens.

In a small way, good results can be obtained by allowing the female quail to select her own nest and hatch the eggs. If left to herself, practically every chick will be raised, but if molested or interfered with, she will neglect the little ones and they will quickly suffer.

Sometimes a male quail will take it upon himself to incubate the eggs and take care of the chicks. In one instance, a male confined with five females sat for the entire period, without any assistance from the females, and hatched eight eggs, leaving fifteen eggs still in the nest. These were put in an incubator and hatched at intervals until all the chicks had come out. This was due, we believe, to the fact that the different hens had laid in the nest while the male was setting. In another instance, a male bird hatched eleven young from a nest in a large cage where over fifty pair of quail were confined.

In the rearing of quail, one of the most important lessons to be learned is the fact that quail can not be confined on ground to which chickens, turkeys or pheasants have previously had access. Quail are particularly susceptible to the poultry diseases, and these diseases are very fatal to them.

Ducks.

We have at the game farm a number of wild ducks—spoonbill, sprig and mallards. Of these, the only species that has shown any inclination to breed in confinement is the mallard. The mallards will incubate their own eggs, or the eggs can be hatched in incubators. The other varieties named show no desire to mate. Young mallards can be given the same treatment as domestic ducks. They are strong and healthy and require comparatively little attention. If they are confined in open pens, the ducklings must be pinioned at an early age, or they are apt to take wing and fly away as soon as the migrating season is on.

STATE GAME FARM, HAYWARD.

Distribution of game birds, July 1, 1912, to June 30, 1914.

Alameda County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Aug. 10	C. J. Smith	Oakland	[3]2		
Sept. 16	C. L. Crellin	Pleasanton	[1]50		
Dec. 27	Alameda County Infirmary	Oakland	[3]5		
Dec. 20	C. J. Smith	Oakland	[3]4		
1913					
Jan. 4	H. A. Snow	Newark	[3]2		
Feb. 11	C. L. Crellin	Pleasanton	[3]4		
Feb. 12	H. C. Cutting	San Lorenzo	[3]3		
Mar. 7	Mrs. S. Mathiassen	San Lorenzo	[3]1		
May 1	California Pheasantry	Oakland	[4]20		
May 7	Jacob Harder	Hayward		[1]4	
May 30	California Pheasantry	Oakland	[4]8		
June 2	H. C. Cutting	San Lorenzo	[3]150 eggs		
Aug. 3	Dr. C. J. Schilling	Oakland		[2]4	
Aug. 16	Geo. Vargas	Hayward	[3]2		
Sept. 28	Mortimer Smith	Oakland		[1]6	
Sept. 29	J. E. Bairos	Pleasanton	[4]3		
Sept. 29	E. E. Hall	Pleasanton	[4]4		
Aug. 28	F. O. Clarke	Berkeley	[2]1		
Oct. 2	DeWitt Dougherty	Pleasanton	[4]2		
Oct. 2	Bert L. Curtis	Oakland		[1]4	
Oct. 27	Walter Haar	Hayward	[4]2		
Nov. 17	Dr. C. P. Paston	Berkeley	[3]9		
Dec. 2	Dr. J. A. Hill	Oakland	[3]2		
1914					
Feb. 28	Fred Hoyt	Hayward		[3]12	
Mar. 1	H. A. Snow	Newark	[3]5		
Mar. 2	D. C. Peters	Hayward		[3]14	
Apr. 12	Miss C. Pastdorf	Hayward	[3]2		
May 8	Herman Hess	Mt. Eden	[3]2		
May 7	P. Versiz	Hayward	[3]12 eggs		
June 19	Jacob Harder, Jr.	Hayward	[3]6		

Colusa County

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1913					
Dec. 29	J. W. Forgens	Williams	[1]120		

Del Norte County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Sept. 25	Paul Smith	Requa	[1]100		
1913					
Sept. 10	Paul Smith	Requa	[1]200		

Fresno County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Sept. 2	J. P. Shellenbarger	Sanger	[1]100		
Sept. 23	F. A. Bullard	Sanger	[1]60		
1913					
Sept. 21	Mrs. S. P. Frisselle	Fresno	[4]2		

Humboldt County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Aug. 24	Earl P. Barnes	Eureka	[1]100		
Aug. 24	Earl P. Barnes	Eureka			[1]50

STATE GAME FARM, HAYWARD.

Distribution of game birds, July 1, 1912, to June 30, 1914—Continued.

Inyo County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1913					
Mar. 19	E. H. Ober	Big Pine	[1]16		

Kern County.

1913					
Dec. 11	Jesse Peter	Pond	[4]2		

Lake County.

1913					
Jan. 16	Lyon Fraser	Lakeport	[1]80		

Lassen County.

1912					
Sept. 4	Frank P. Cady	Susanville	[1]100		
Sept. 21	Geo. Wingfield	Janesville		[1]50	
Sept. 13	A. J. Hall	Doyle			[3]1

Los Angeles County.

1913					
Sept. 30	S. M. Morgan	Los Angeles	[4]2		
Oct. 6	S. M. Morgan	Los Angeles	[4]4		
Dec. 13	Hugh D. Corrough	Los Angeles	[4]2		
1914					
Feb. 2	Griffith Park	Los Angeles	32 (Exhibition)		

Madera County.

1914					
Mar. 2	County Park	Madera	1 (Exhibition)		

Marin County.

1912					
Nov. 23	V. D. Thomas	Ignacio	[1]25		
1914					
Mar. 24	W. S. Leake	Ross	[3]2		

Mendocino County.

1912					
Sept. 13	B. H. Miller	Ukiah	[1]50		

Monterey County.

1912					
Aug. 12	Phil Oyer	Pacific Grove	[1]100		
1913					
Dec. 8	Phil Oyer	Pacific Grove	[1]100		

STATE GAME FARM, HAYWARD.

Distribution of game birds, July 1, 1912, to June 30, 1914—Continued.

Napa County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Sept. 13	W. J. Moore	Napa	[1]50		
Sept. 18	John McCormick	St. Helena	[1]50		

Nevada County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Sept. 18	Dr. I. W. Hays	Grass Valley			[1]30
1913					
Sept. 21	Richard Noel, Sr.	Grass Valley	[4]2		

Placer County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Dec. 12	Lawrence & Comstock	Lincoln	[2]1		
Sept. 5	M. Godley	Lincoln			[1]25
1913					
Sept. 3	H. O. Comstock	Lincoln	[1]6		

Sacramento County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Oct. 7	M. Locke	Walnut Grove	[1]50		
1913					
Aug. 28	Louis Meiss Estate Co.	Clay	[1]24		
Sept. 12	George Neale	Sacramento (Grand Island)	[1]42		
Sept. 21	H. A. Alspach	Sacramento (McKinley Park)	2 (Exhibition)		
Sept. 21	Mrs. Shick	Sacramento	[4]2		
Sept. 21	J. E. Short	Sacramento	[4]2		
Oct. 20	Natomas Consolidated	Sacramento	[1]82		
Oct. 20	Geo. Locke	Walnut Grove	[1]84		
Oct. 20	Jos. Green	Courtland	[1]86		

San Benito County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Aug. 20	J. H. Hill	Hollister			[1]50
Sept. 9	J. Lee Jones	Tres Pinos	[1]100		
1913					
Sept. 30	J. H. Hill	Hollister	[1]100		
Dec. 17	Dr. H. J. Macomber	Tres Pinos			[1]3

San Francisco County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912					
Aug. 29	D. A. White	San Francisco	[3]2	[2]25	
Sept. 18	Capt. C. A. Gove	Yerba Buena Island	[1]25		
1913					
Oct. 13	W. H. Wubben	San Francisco	[4]2		

STATE GAME FARM, HAYWARD.

Distribution of game birds, July 1, 1912, to June 30, 1914—Continued.

San Luis Obispo County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Nov. 2	J. P. Andrews	San Luis Obispo	[3]1		

San Mateo County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Dec. 23	Jack Boshoff	Pescadero	[1]40		
1913 Apr. 23	W. B. Lawrence	Millbrae		[1]42	

San Joaquin County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Sept. 5	J. W. Steinbeck	Stockton		[3]2	

Santa Clara County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Nov. 20	C. R. Harker	San Jose	[3]4		
1913 Mar. 18	George Clark	San Jose	[1]3		
Mar. 18	Gus Lyon	San Martin	[1]3		
Mar. 28	George Clark	San Jose	[1]3		
Apr. 2	F. A. Curtis	San Jose		[3]2	
1914 June 30	F. A. Curtis	San Jose	[3]6		

Santa Cruz County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Aug. 13	Geo. Martin and H. C. Peckham	Watsonville	[1]50		

Shasta County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Oct. 4	C. C. McCray	Redding			[1]32

Siskiyou County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1913 Sept. 1	Dr. A. A. Milliken	Fort Jones	[1]200		

Solano County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Dec. 17	C. Pardi	Vacaville	[3]2		
Aug. 27	John Hollenbeck	Ryer Island	[1]100		
1913 Dec. 13	Cæsar Pardi	Vacaville	[3]2		

STATE GAME FARM, HAYWARD.

Distribution of game birds, July 1, 1912, to June 30, 1914—Continued.

Sonoma County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Sept. 15	F. M. Child	Cazadero			[1]25
1913 Aug. 7	Rufus Steele	Bohemian Grove		[1]25	
Dec. 8	T. C. Reedull	Petaluma	[4]1		

Stanislaus County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Aug. 14	Geo. Prowse	Oakdale		[3]1	
1913 Nov. 2	C. T. Kennedy	Knights Ferry	[4]2		
Nov. 18	C. T. Kennedy	Knights Ferry	[4]2		
Dec. 4	Dr. J. B. Thompson	Oakdale	[4]4		

Sutter County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1913 Sept. 21	Dr. Jacobs	Meridian	[4]2		

Tulare County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Sept. 1	J. D. Blick	Three Rivers	[1]50		
Sept. 1	Tom Jacobs	Visalia	[1]25		
Sept. 1	Porterville Game Protective Association	Porterville	[1]50		
Sept. 23	Deer Creek Fish and Game Protective Association	Hot Springs	[1]40		
1913 Mar. 17	Jud Blick	Lemon Cove	[1]1		

Yolo County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1913 Apr. 14	University Farm	Davis	[2]150 eggs		
May 17	University Farm	Davis	[2]150 eggs		

Yuba County.

Date	Applicant	Address	Pheasants	Quail	Wild turkeys
1912 Nov. 20	Dr. Barr	Marysville		[2]2	
1914 Jan. 8	W. R. Hendricks	Browns Valley	[4]3		
1913 Oct. 6	Geo. Wingfield	Reno, Nevada	[4]10		
Nov. 5	B. R. Smith	Portland, Oregon	[4]2		
		Totals	2,655 birds 462 eggs	193	216

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[1] Released.
[2] Given for experiment.
[3] Exchange for other birds, etc.
[4] Sold.

REPORTS OF SPECIAL ASSISTANTS.

STREAM SURVEYS AND MAP WORK.

By CHAS. L. GILMORE, Engineer-Draftsman.

Importance of Accurate Knowledge of Streams.

To the State Fish and Game Commission, the importance of a thorough knowledge of the various watersheds of California, their location, runoff, impounding areas, etc., is most essential to the proper conduct of fish and game protection, preservation and propagation.

The whole of the present and future of the fish life of the state depends upon our water resources. Without this natural element of fish life they would entirely disappear from the face of nature; for no artificial method of sustaining fish without water has yet been discovered.

Water Supply and Its Relation to Game.

In the matter of the distribution of game there is a proposition analogous to that of fish. The abundant wildfowl in California that breed within the confines of this state nest in our lake and swamp regions. Their feeding places are in our valleys in our swamp areas, that have, in many instances, indeterminate areas. Our game is most abundant in those portions where streams and lakes are most plentiful and this water results directly in the heavy stand of timber that acts as a natural shelter to the game. Those areas classed as arid and semi-arid and devoid of a natural supply of water are as nothing in importance to the human family in the matter of game when compared with the well watered, heavily timbered mountains or the fertile valleys with their adjacent swamp areas.

Accurate Stream Records Essential.

Knowing and realizing the importance of a knowledge of the water resources of the state to the intelligent despatch of fish and game protective and preservation methods, the present Fish and Game Commission set about obtaining complete and accurate information on this subject.

Since there is but one method of surveying in vogue in the United States, it follows that accurate and authentic maps are the best methods of recording data of the character desired. Further, maps drawn to scale accord with the United States system of land surveys are easily understood, easily used as reference records and may be constructed as complete as may be desired. There is no better or more adequate method of recording the streams, lakes, ditches, canals, reservoirs, etc., together with volume of diversions, than by means of maps.

Data Collected and Recorded.

In 1912, this Fish and Game Commission initiated the task of gathering all available data relative to streams, etc., and preparing accurate and authentic maps whereon all this data, together with all fish distribution in its proper position with reference to the locality of the actual plant. In June, 1912, I had the honor to be appointed to conduct this very important work.

The base maps for the commission are drawn in conformity with the United States land surveys. The data has been obtained from all available authentic sources, such as United States land and geological surveys, private surveys conducted by power, irrigation and railroad companies, county surveys and a few original surveys carried on by myself in person.

Acting under instructions of the commission I began work with the Truckee River system, the outlet of Lake Tahoe. This river basin is one of the best patronized trout localities in the state.

A base map of the basin was first prepared whereon was placed all streams, lakes, etc., and this was followed by the addition of all dams that could possibly be classed as stream obstructions whether they were provided with fish ladders or not. Likewise I obtained from the records of the assessors of the several counties through which the river and its tributaries flowed, the names of all owners of land bordering or adjacent to the streams and placed this data upon the map.

Getting a Corner on Fishing Streams.

This Truckee River map brought to light a peculiar condition of affairs. An enterprising company, owning all the land on both banks of the Truckee River from a point near Lake Tahoe to the town of Truckee, divided the 15-mile strip into lots of approximately two acres each and having a frontage of practically 200 feet on the river. These lots were put on the market with the understanding that each purchaser of one or more lots would own, in fee simple, the all and exclusive right to fish in that portion of the river immediately fronting his lot or lots. The publicity given section 4085½ of the Political Code, which authorizes the county boards of supervisors to condemn a public highway along certain streams for the exclusive use of fishing, had the effect of causing this company to withdraw its fishing promises.

After completing the Truckee River, I platted the McCloud River Basin. Here was found a like condition. One club and two or three individuals own or control practically thirty miles of the best fishing on the river. Even deputies of the commission have been refused permission to enter the sacred precincts of these fishing barons, and it required no little diplomacy and exchange of hard words to change their attitude. However, with the educational propaganda of the commission, these people have modified their regulations very considerably in most instances. The McCloud River is widely known as the home of the rainbow trout, and its even flow throughout the driest of summer periods makes it one of the best trout streams in the state. It has a mean daily flow of 2,509 second feet of water.

After the completion of the Truckee and McCloud systems, I mapped the Sacramento River, showing the ownership of the lands adjacent and adjoining as in the case of the prior maps.

I then turned my attention toward obtaining accurate information relative to the mileage of streams and acreage of lakes, together with the mean daily flow of the streams and the approximate volume of the lakes, reservoirs, etc. Also I collected data relative to the rainfall of the state, temperature and general topographic features. California is the cellar and roof of the United States in that we have Mt. Whitney, the highest mountain in the United States proper, being 14,502 feet above the sea, and Death Valley, the lowest point on the whole American continent, being 427 feet below mean tide. Our climatic changes vary from 30 degrees below zero to 128 degrees above, Fahrenheit.

At divers times I continued the actual map drafting and have the bases completed for the Klamath, Pit, Feather (in part), Yuba, Bear, American and Smith River systems and the Lake Tahoe drainage basin. Have prepared a map showing the approximate locations of all proposed by-passes and cuts in the Sacramento Valley, together with existing and proposed reclamation districts.

Stream Mileage and Lake Acreage.

As I have already reported, the mileage of all streams in the state not intermittent in character and capable of sustaining fish life at all seasons of the year, I have set at 26,212. I have set the acreage of freshwater lakes at 862,133. This lake area would be increased were it possible to carry on an exhaustive resurvey of certain of our mountain lake regions. The earlier surveys executed by and under the authority of the United States government, are, in many instances, merely office surveys and the land purported to be surveyed never beheld a surveyor's transit. Numerous lakes are positively known to exist in localities when the official surveys show dry land. This commission has stocked with trout hundreds of these lakes and many of them exceed 160 acres in extent. This further shows the importance of having accurate data to refer to and maps whereon to record work of this character.

From the reports of the United States Geological Survey and from power and irrigation companies I have gathered considerable data relative to the flow of the streams. With respect to the volume of water carried by our streams it is pertinent to take into consideration the geologic formation peculiar to the mountain regions of northern and south central California. The higher elevations are almost wholly lavic in character, and capable, through its porous character and possible underlying beds of tuff or tufa, of absorbing immense quantities of water. The gradual melting snows supply the millions of springs adjacent to this area with a perennial flow of water and distributes the runoff through and over a period of months. However, our "nature sponges," as this formation might well be called, can not care for and control the downpour of heavy rains such as we have in the later winter months. At that period the "sponges" are filled almost to their greatest capacity and the runoff is swelled to an enormous volume—attended by the annual floods in the lower valleys. The Sacramento River is a fair example of the river systems having a maximum flow in winter and a minimum in summer. During the flood period of January, 1907, this river was carrying under the Southern Pacific bridge at Sacramento City, 650,000 second feet of water.

In closing, I wish to say that when the proposed maps are completed the California Fish and Game Commission will have in their possession the most unique, and, at the same time, the most complete set of records covering every activity of this and former commissions on streams and stream life in use by any commission in the United States. These maps will show, in addition to natural and artificial stream data, the elevations at different points, temperatures, rain and snow fall and, in fact, many items necessary to the proper and intelligent conduct of affairs of the Fish and Game Commission.

Sacramento, California, June 30, 1914.

THE TUNA CANNING INDUSTRY OF SOUTHERN CALIFORNIA.

By N. B. SCOFIELD, Fishery Expert.

The long-finned tuna or albacore (Thunnus alalunga).

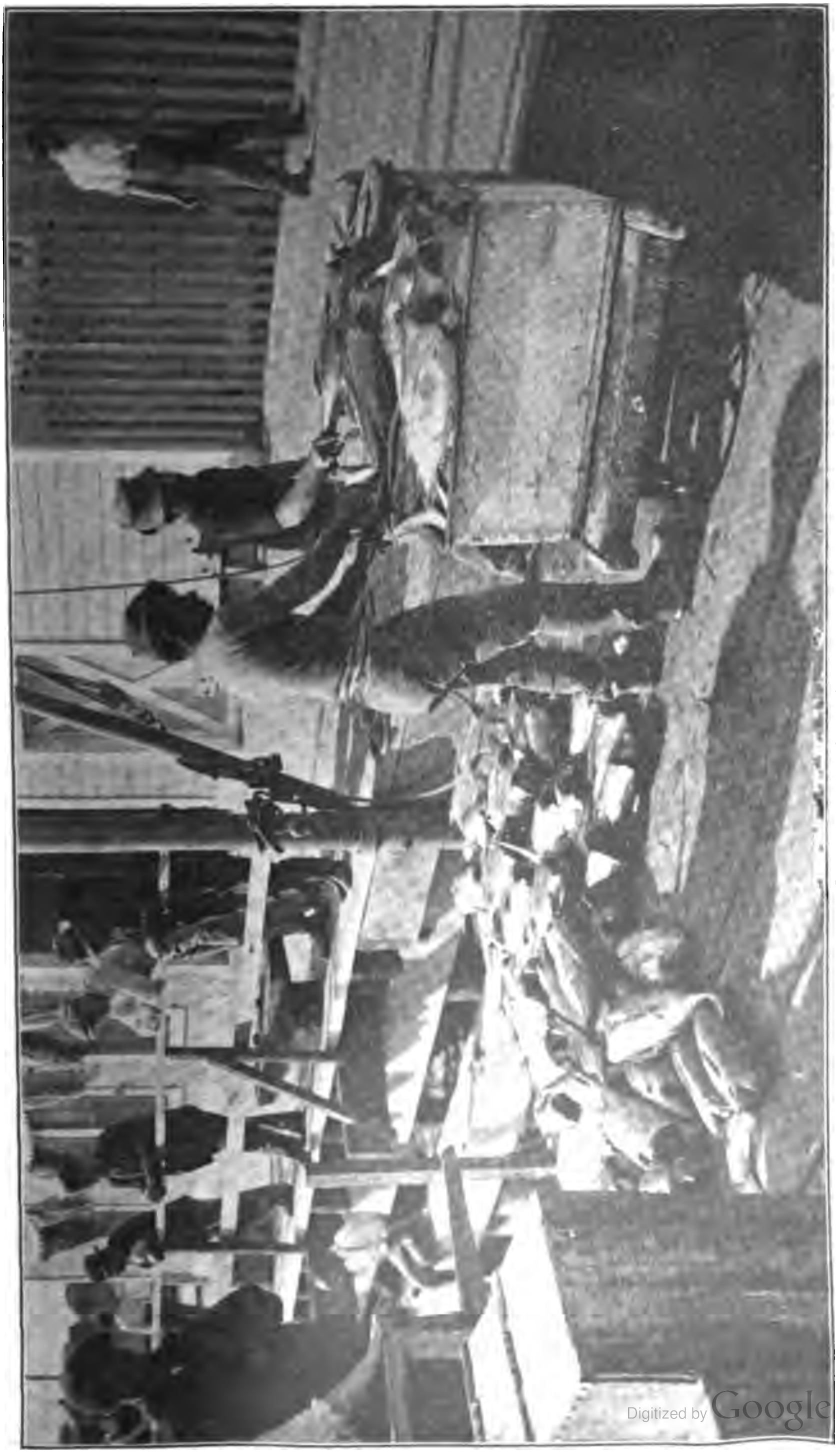
General Description, Habits and Food.

There are several species of tuna in southern California waters, all of which may be styled game fish, but the one we have to deal with is commonly known by the name of albacore, less frequently called the long-finned tuna.

It is a thickset fish, as wide as it is deep and averages about twenty pounds in weight. In contour it has the lines of a submarine torpedo. It is built for speed and quickness in the water. Deep steel blue above and silvery beneath, with long sabre-like pectoral fins two fifths the entire length of the fish. The albacore is pelagic, a fish of the high seas and of very wide distribution in the warm seas of the world. It is found in deep clear water and rarely nearer than a mile or two of shore, or in shallower water than seventy fathoms. It is found in the Mediterranean and is abundant off the coast of Lower and southern California and in Japan. It is usually found in schools the individuals of which are not in compact masses but well scatterred. It swims rather deep in the water, but will quickly dart to the surface for sardines, anchovies, smelt or squid, which constitute its principal food. Its stomach often contains small devil fish, sculpins and rockfish, indicating that it also feeds near the bottom. The albacore which were being taken off Santa Monica Bay, California, during July, were gorged with small two-inch anchovies.

The albacore's season in southern California is, roughly, from May to December, although they may be found in small numbers during the other months of the year. When stormy weather sets in the fish almost entirely disappear, and it is the general belief that they move southward. Very little is known about the migrations or spawning habits of the albacore. The most reliable information I have obtained on the subject was given my by Mr. M. Kondo, formerly professor in the Imperial Fisheries Institute at Tokyo, and by Mr. S. F. Takasaki, an assistant from the same institution. These gentlemen have made investigations in Lower California during the last two years. On March 7, 1912, while trying for albacore near Magdalena Bay, they took twenty fish by trolling. The fish were mature and ready to spawn. The roe of the females was about the same size as codfish roe, and was a light brownish red color. Toward the end of March, this year, they again took albacore with mature roe off San Batrome (?) Bay, Lower California, and at that time observed large patches of floating eggs, which they were satisfied were

Unloading albacore (tuna) from launch at San Pedro.



Japanese unloading albacore (tuna).

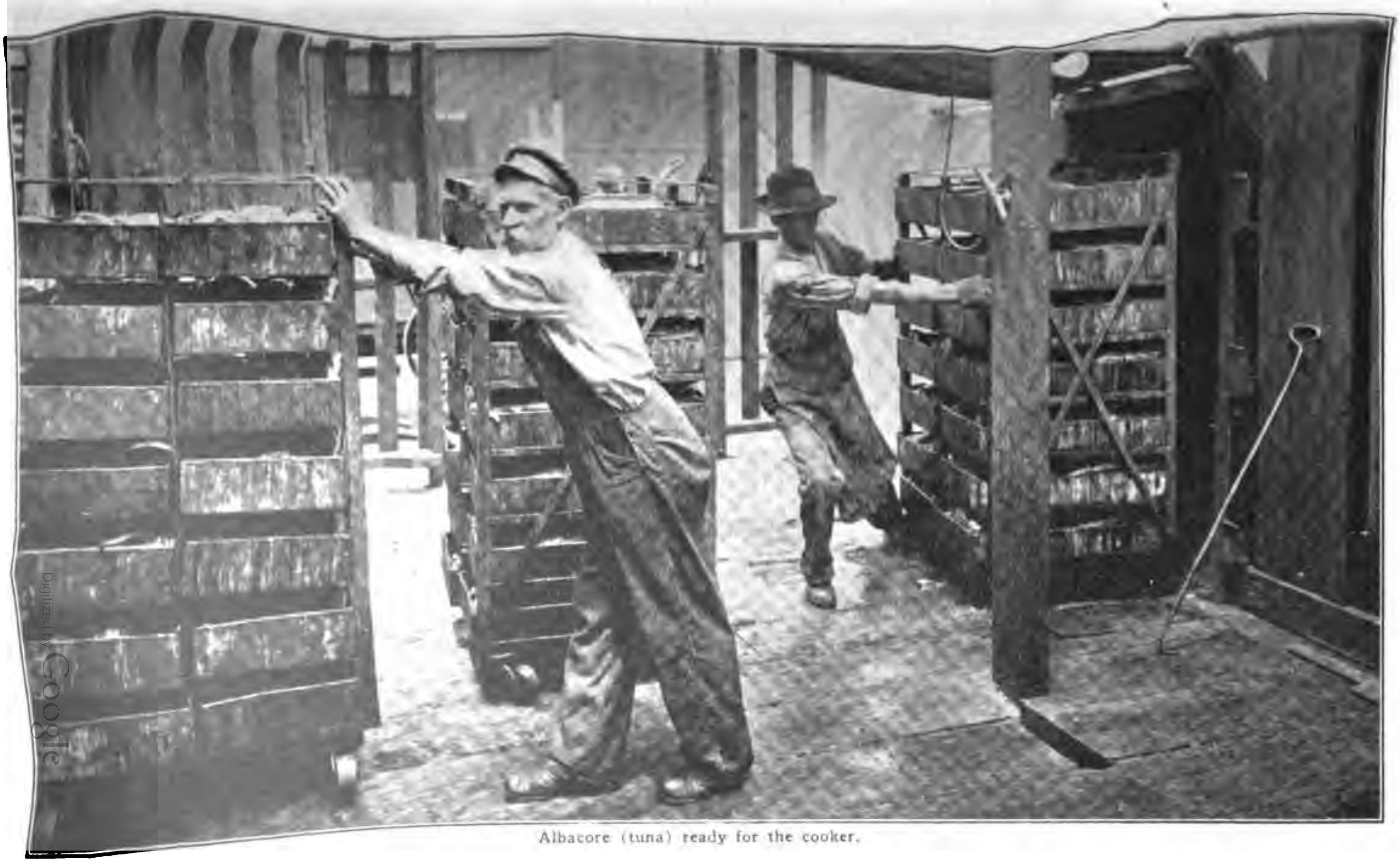
either the eggs of the albacore or of the bonito. They could not be sure which they were for they also took bonito with mature roe. In both of these instances the albacore were found well off shore in deep water. At San Lucas they found albacore plentiful in January. On visiting San Lucas again in August they found them still plentiful. At this time all had spawned. Mr. Kondo believes albacore are plentiful at San Lucas the year round. They appear off Magdalena Bay in numbers in April and usually enter the bay itself in August.

It seems reasonably certain from this evidence that the albacore begins spawning in March near the latitude of San Lucas, Lower California, in deep water off shore. The eggs are buoyant and float at the surface of the water. The albacore moves northward, in the late spring, in search of food. The fish taken during the early part of the run in southern California are considerably smaller than those taken later. A reasonable explanation of this would be that the larger mature fish are occupied with the business of spawning and do not move northward as early as the immature fish. It is not likely that the albacore spawns near the Santa Barbara Islands, as some have thought, for fish with mature roe are not taken there. When the fish arrive in May or June they have very immature roe or have already spawned. Fish under eight pounds are not common, and one as small as two pounds is a rarity. The albacore's appearance here coincides with the appearance in abundance of sardines. The fishermen believe the albacore follow the sardines and other food and that there is a general movement up the coast in the spring of the year. As far as we know the albacore does not run in numbers north of the Santa Barbara Islands. Occasional individuals are taken far north of that point. One is recorded 250 miles north of San Francisco, taken on a "jig" made of a hook and seagull feathers, late in the fall of the year, by returning Alaska salmon fishermen.

The Albacore in the Mediterranean Sea.

In the countries bordering the Mediterranean on the north, the albacore is valued very highly as a food fish. It is evidently not nearly so plentiful there as here, and the fishermen fish for it with large gill nets three hundred fathoms long. They are held in such esteem there that the fishermen themselves usually can not afford to eat them, but sell them for a good price and for themselves use less expensive fish.

Those who have eaten the Mediterranean albacore consider the fish taken here its equal if not superior in quality and flavor, but until within recent years the albacore here has not played an important part in the food supply. Small quantities were salted and dried for the Portuguese and Japanese trade, but not until enterprising packers began canning it and advertising it did the people appreciate it.



Albacore (tuna) ready for the cooker.

Origin and Growth of the Tuna Canning Industry.

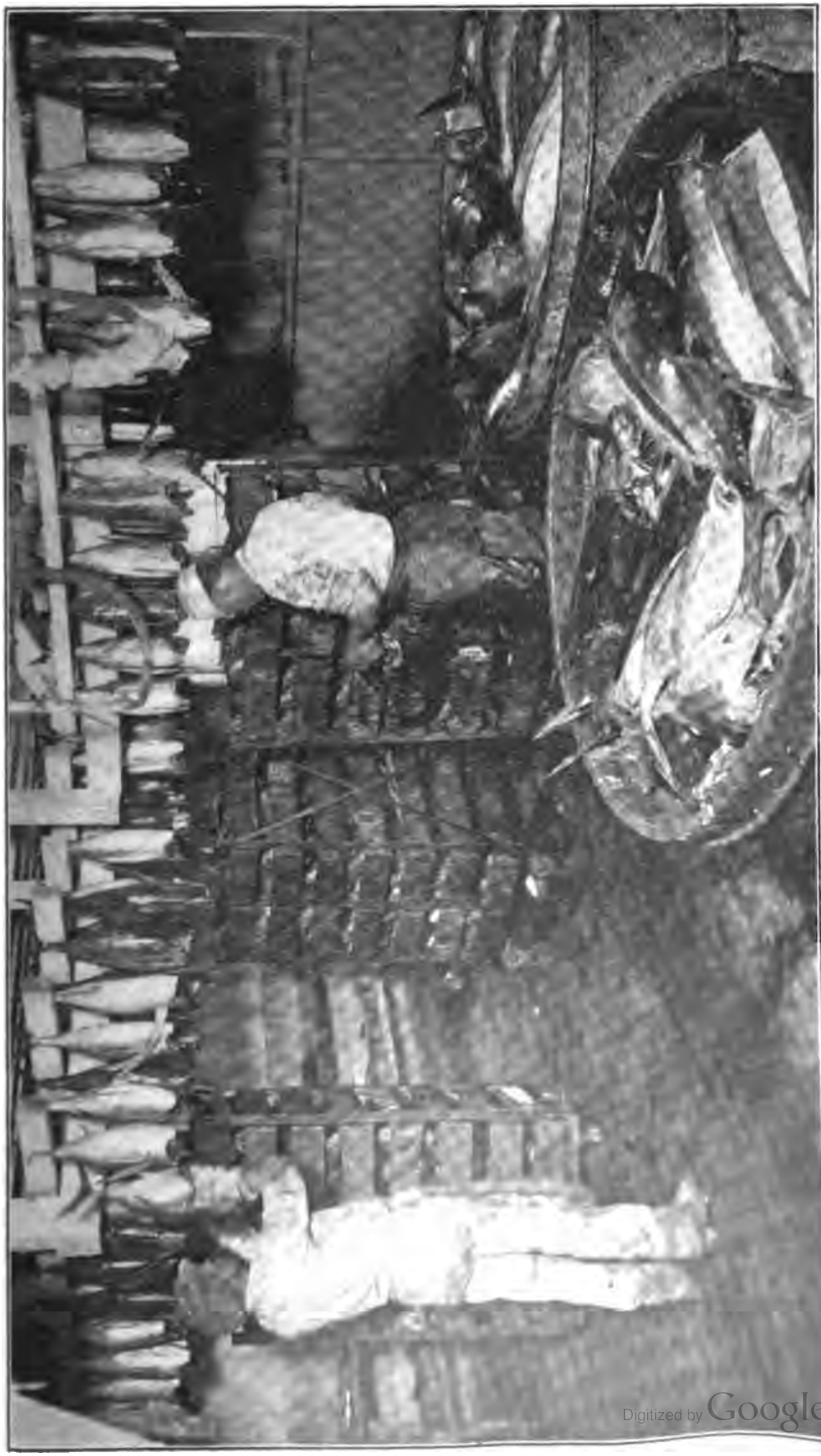
About six years ago the Southern California Fish Company of East San Pedro packed a few cases of albacore as an experiment. The first important pack was in 1911, when the above cannery and the Pacific Tuna Canning Company of San Diego together put up about 20,000 cases. From that time on the industry has grown enormously. In 1912 there were five tuna canneries in southern California which put up 80,000 cases. In 1913, there were nine canneries which put out 128,000 cases, or roughly 6,400,000 pounds. In canning, but little more than 50 per cent of the whole fish is used; so that the weight of the fish as they were taken from the sea was about 12,000,000 lbs. At this time, July, 1914, there are eleven canneries located in southern California, and at least one more in Lower California at Magdalena Bay. The canneries of southern California up to July 18th had taken 90,000 cases or, roughly, 9,000,000 pounds of the whole fish as they come from the ocean. The season so far is considered poor. The fish have not been as plentiful as it was hoped they would be. Preparations had been made to put up a large pack, for the demand for canned tuna has been great. The combined canning plants expected to put up 300,000 cases. The season is probably not half over, however, and they may yet put up very nearly this expected amount, which at the ruling prices would bring, at wholesale, over $1,500,000.

Other Uses of the Tuna.

Besides the tuna that are canned, large quantities are used in the fresh markets, and the demand for this fish in a fresh condition is very rapidly growing. It is estimated 200 tons of fresh albacore will be handled through San Diego and Los Angeles markets this year. It was reported at San Diego that an eastern order had been placed there for 300 tons of albacore to be shipped frozen. At least three companies are putting up salted and smoked albacore or tuna. One of these firms, the Redondo Fish Company, will put up 350 tons this year if they can get the fish.

Method of Taking the Albacore in Southern California.

Boats.—The boats engaged in taking albacore are good seaworthy boats of about five tons and driven by 15 to 25 horsepower gasoline engines. They are decked in and have a cabin that accommodates the three men of the crew. The average cost of these boats is $2,500. Placed on the deck and near the stern of each boat is a square tank for holding and keeping the sardines, anchovies and smelt used for bait. A pump connected with the boat's engine keeps fresh sea water constantly circulating through it to keep the bait alive. Each boat also has its own small meshed net for catching this bait. Before daylight the boats start out and run to wherever they can get sardines, which are considered the



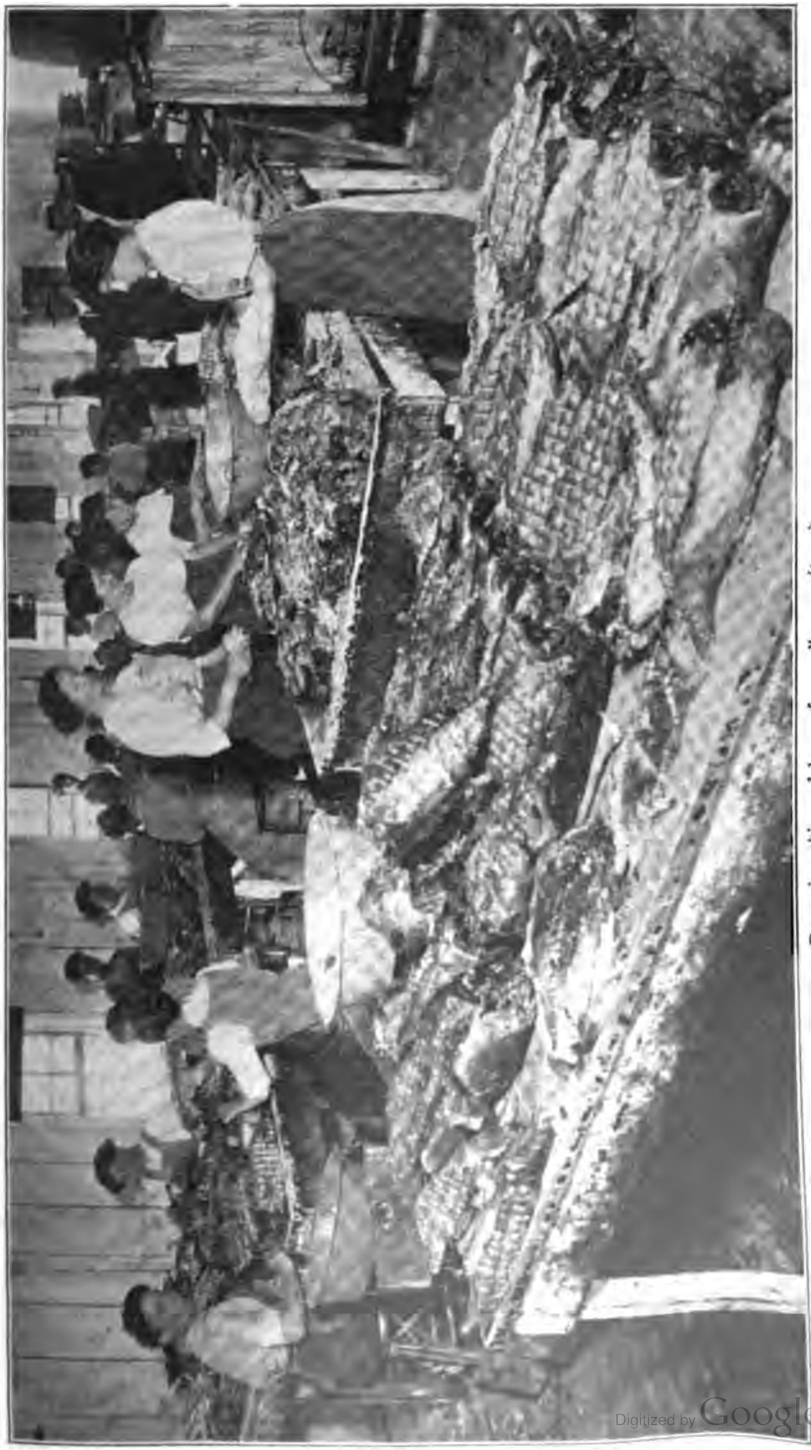
Hanging albacore (tuna) by tails to drain.

best bait that can be used. After they have secured sufficient bait, which is very often not easy to get, they start out into the open sea for the fishing grounds, trolling behind them a couple of "jigs" or lures, which are made of bone and so fashioned that they resemble a small fish as they are drawn through the water. These "jigs" are usually homemade affairs, each boat having its own particular pattern. When an albacore seizes or "strikes" one of these lures, the boat is quickly brought to a stop, the men at the same time throwing out live bait to draw the fish around the boat. Soon they can be seen "breaking" at many places about the boat as they come to the surface after the sardines thrown out. Hand lines are then thrown over baited with the sardines, each man operating one line. If the albacore are biting well, a ton or more are caught in a very few minutes. When they cease to bite, the boat moves on, with the lures out as before, until another school is struck.

Another method of catching the albacore is by pole and line. This method was introduced by the Japanese and is called the "Jap pole" method. A short, unyielding bamboo pole is employed with a line slightly longer than the pole itself. A live sardine is hooked through the back and so held with this pole and line that it swims about on the surface of the water. The pole is supported by one hand with its butt against the body. With the other they scatter splashing drops of water around the swimming bait, with a cup shaped bamboo paddle tied at the end of a short springy piece of bamboo. This is supposed to make the one sardine look like a whole school. If the fisherman is alert he will check the albacore as soon as it seizes the bait and before it gets started down with it, and lifting it bodily from the water, swings it into the boat in one mighty heave. When the albacore are coming fast this is the favorite method of fishing, for it is much faster. With the hand lines a gaff has to be used to lift the fish into the boat.

The albacore are cleaned or dressed at sea by the fishermen. The head and entrails are removed, in which process the fish loses about 18 per cent of its weight. For the dressed fish they receive from the canneries 1½ cents per pound. Anything less than a ton of fish is considered a poor catch and catches of four to six tons are common.

The Capture of Bait.—In fishing for albacore the most difficult part is obtaining the bait. Very often the sardines or anchovies are hard to find or the fishermen may have to go a long distance out of their way to get them. Frequently some of the boats are not able to obtain bait at all. Small meshed nets of two types are used for capturing this bait. Practically all boats carry a small net known locally as the "blanket net." It was introduced by the Japanese. A few of the boats now carry circle or lampara nets, the largest of which are 350 feet long and about 40 feet deep.



Removing skin and bones from albacore (tuna).

It is necessary to use the larger nets when the sardines and anchovies are scarce. The "blanket net," I think, is a harmless net and does little or no damage. The circle net is usually cast where a school of sardines or anchovies is observed at the surface of the water, and the nets take little else. The only serious damage they could do would be when they are used in too shallow water and the lead line drags the bottom. I understand they seldom use it where the water is shallow.

No legislation should be contemplated which would hinder these nets in the taking of fish for bait, as it would seriously cripple the tuna industry. Due to the scarcity of bait at times, I think it would be to the best interest of the people as a whole in the southern part of the state to allow the restricted taking of bait within fish preserves.

The Canning of the Tuna.

Only the long-finned tuna or albacore is used in canning. The dressed fish are brought in by the boats in the afternoon or evening to the cannery wharf, where they are unloaded and hung by the tails to drain over night. The next day they are packed in wire baskets and cooked with steam in large retorts. They are rolled on trucks from the retorts to the cooling room, where they remain until cooled. They are then carried to the tables, where women and girls remove the skin, bones and dark meat. Only the white meat goes into the cans. The rest of the process is very similar to the canning of salmon or other fish. The latest canning machinery and equipment is the rule in the tuna canneries. The plants are new and most of them have started out with the best.

There are now eleven of these canneries in southern California, located at San Pedro, Wilmington, Long Beach and San Diego. They have approximately $300,000 invested in buildings and their equipment. Besides this there are the boats, about 125 of them, worth at least $300,000 more.

Following is a list of the canneries with their estimated capacity:

Van Camp Sea Food Company, San Pedro.
Formerly the California Tunny Canning Company. They can handle 35 tons of dressed fish daily; put up the "Van Camp's" Brand.

White Star Canning Company, East San Pedro.
Capacity, 15 tons daily; put up the "White Star" Brand.

Southern California Fish Company, East San Pedro.
Capacity, 15 tons daily; put up the "Blue Sea" Brand.

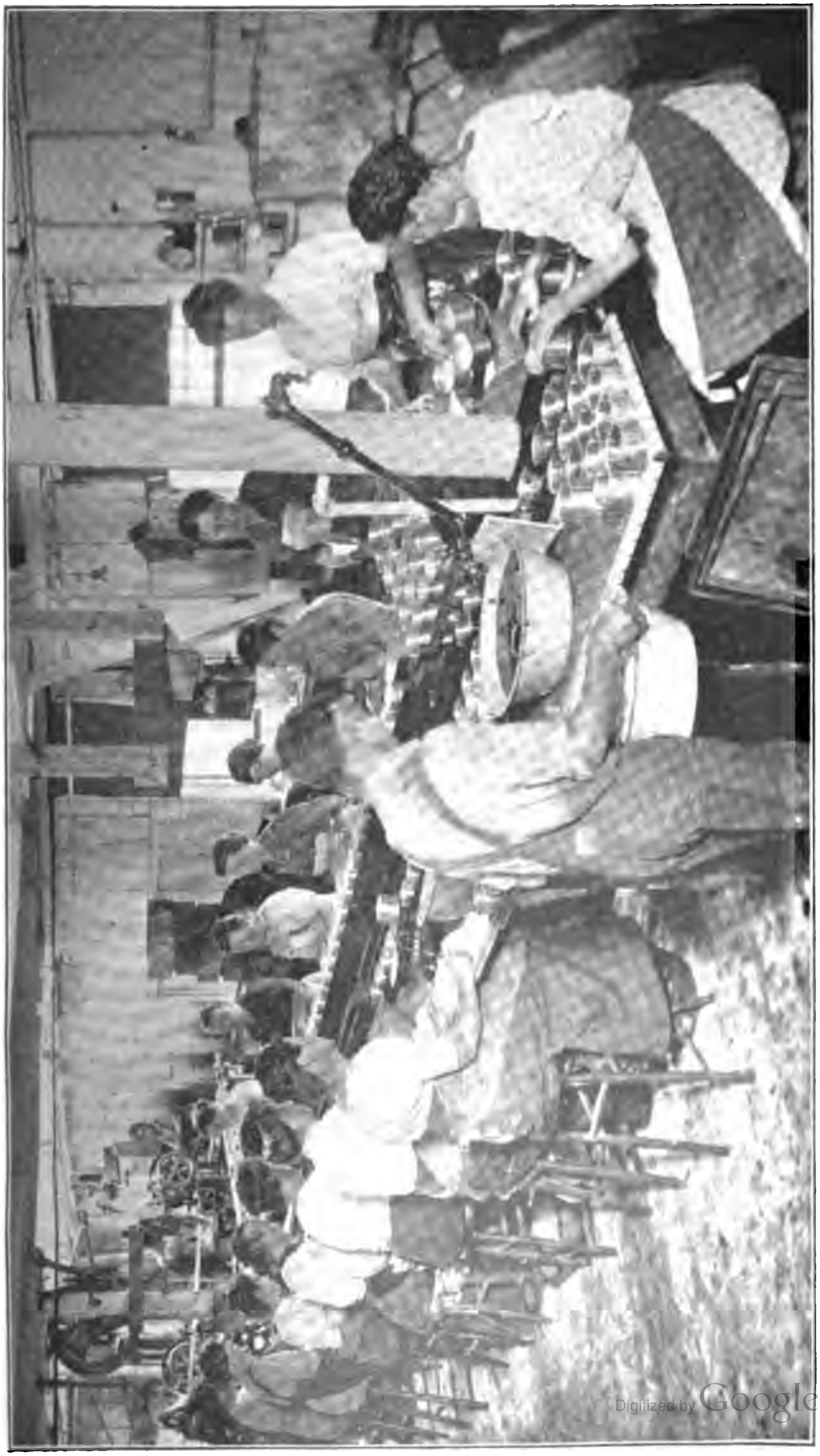
United States Fish Packing Company, Wilmington.
Capacity, 5 tons daily.

United Tuna Company, Wilmington.
Capacity, 25 tons.

Monarch Canning Company, Wilmington.
Capacity 8 tons daily; put up the "De Lux" Brand.

Los Angeles Tuna Canning Company, Long Beach.
Capacity, 15 tons; put up the "Panama" Brand.

South Coast Canning Company, Long Beach.
Capacity, 35 tons; put up the "Avalon" Brand.



Canning albacore (tuna) at San Pedro.

Lower California Canning Company, San Diego.
Occupies the site of the former Roberts-Hume Fisheries Company; capacity, 20 tons.
Pacific Tuna Canning Company, San Diego.
Capacity, 20 tons; put up the "Catalina" Brand.
Premier Packing Company, San Diego.
Capacity, 15 tons; put up the "Premium" Brand.

Of these canneries the Southern California Fish Company has canned sardines for several years. At least three others, the Lower California Canning Company, San Diego, the South Coast Canning Company, Long Beach, and the Van Camp Sea Food Company, San Pedro, will can sardines this winter. The rest of the canneries are likely to soon be canning other varieties of fish, rather than allow their plants to be idle the five or six months between tuna runs. These canneries will greatly expand the fishing industry of southern California. Improved methods of fishing will undoubtedly be introduced. The taking of albacore with hook and line is rather a primitive method, but still very effective while the fish are numerous. Occasionally, though, the fish do not bite, although they may be there in large numbers. So far, no net has been successfully used in these waters for the taking of albacore.

As to the probable effect of intensive fishing for albacore, it is not likely that intensive albacore fishing in California waters will ever greatly reduce the numbers of these fish. The spawning fish are not taken in California, neither are the young; nor is it at all likely that all the albacore migrate into California waters between spawning seasons. Any laws looking toward the preservation of these fish would have to apply to Mexican waters, where the fish spawn and the young are to be found. Intensive fishing near San Lucas, where they spawn and are found throughout the year, would undoubtedly affect the California fisheries seriously.

The Utilization of Fish Waste.

When the albacore are caught at sea, they are at once cleaned, and 18 per cent of the fish is thrown away and is a total loss. The dressed fish, before it is in the cans, loses a third or more of its weight. This one third of the cooked fish is at the present time turned over to "fertilizer" plants which pay from 75 cents to $1 a ton for it. They convert it into chicken feed and sell it for about $50 a ton. Some of the canneries expect to put in plants of their own to take care of this waste. The Lower California Canning Company will put in a plant to convert this waste into chicken feed. They expect to make a well balanced chicken food of it by the addition of ground red abalone shells. Other canneries expect to can their cooked "scraps" for chicken feed. It probably will not be long until they will be using the heads and entrails, now thrown away at sea, for fertilizer. It is proposed to use kelp fertilizer, which is rich in potash, with fish waste, which is rich in phosphoric acid and nitrates, thus making a well balanced fertilizer.

FISH AND GAME CONDITIONS IN THE "LAND OF LITTLE RAIN."

By E. H. OBER, Assistant Commissioner.

Inyo County has an area of 10,294 square miles; its boundaries are, north, Mono County; east, the Nevada state line; south, Kern and San Bernardino counties; west, Fresno and Tulare counties; its surface is largely mountainous, interspersed with large valleys, of which the Owens Valley is the largest, being over one hundred miles long and about seventeen miles wide at Bishop City, and varying in width as one goes south from four to ten miles. The Sierras here being impassable by wagon, the valley is reached from the north or south only, from California points, with the exception of four fair packtrails which lead across the Sierras.

The altitude of Owens Valley ranges from 3,620 feet at Keeler, the southern point, to 4,148 feet at Bishop, in the north; Mount Whitney, the highest peak in the United States, is within Inyo's borders, and many slightly less high neighboring summits afford scenic views scarcely less grand. We also have Death Valley, one of the lowest depressions in the world, at one point 430 feet below sea level. On each side of this wonderful Death Valley mountains rise to an altitude of from 8,000 to 10,000 feet, and within its bleak wastes desolation reigns supreme; a temperature of 120 degrees, and even higher, is not rare here. Naturally, in view of the foregoing facts, there is a tremendous amount of misunderstanding concerning this region, people generally accepting the sole functions of the valley as that of Creation's morgue; but it may be truthfully said that almost in its very heart springs of pure cold water are to be found, small tracts of land are now under cultivation, and more are sure to become so in the years to come. Similar conditions exist in the desolate valleys of Pannamint, Saline, Cow Horn and Eureka, these being continuations of Death Valley, lying to the north and west, and all being located in Inyo County.

Writers of note have frequently referred to Inyo County as a "sportsman's paradise," and that the Sierra Nevadas, particularly their frontage west of the Owens Valley, are, from a scenic standpoint, unsurpassed by any portion of the globe.

Mountain sheep are very plentiful in Inyo County, especially in the southeastern portion where the Nelson or desert sheep makes his home; their increase within the past five years has been truly wonderful, due to the fact that each year has brought forth an abundance of rain, with its consequence of plenteous feed in the particular habitat where these sheep abound, and to the further fact that very little if any mineral prospecting has been done, which certainly acts as a disturbance and cause of much loss of life to the sheep.

That which is, perhaps, the largest herd of mountain sheep in Inyo County, may be found around and near Homestake Canyon, on the eastern slope of the White Mountains about twenty miles east of Independence. This herd numbers upward of one hundred and fifty head, but they have been observed, however, in separate bunches, eventually reuniting. Homestake Canyon is their watering place during the summer months.

East of Homestake Canyon, and across Saline Valley twenty miles to Hot Springs, and around Sand Springs and Last Chance Mountain, mountain sheep may be found everywhere; also on Ubehebe Mountain, lying east of Saline Valley, mountain sheep are very abundant, and south of Ubehebe Mountain for one hundred miles; all through the Funeral, Argus, Pannamint and Slate ranges of mountains, they abound. They are most numerous, however, in Inyo County, in the above named mountains, and in and around "Windgate Pass" and the Sheep Mountain country, and on the western slope of Tin Mountain northeast of Ubehebe Mountain.

Mount Tom in Inyo County. The home of 100 "bighorns" (mountain sheep).

Directly east of Big Pine, about thirty miles, there is a very beautiful herd, the writer, on several occasions having seen as many as sixty at one time, and thirty-eight and forty at others; very reliable reports reach me concerning their splendid increase each year.

The Nelson or desert sheep vary in color at different seasons, ranging from a pale gray in summer to a pale blue in winter. Desert sheep frequent the most remote and precipitous and barren mountains imaginable, using for their shade and resting place the faces of perpendicular cliffs. Their food consists chiefly of the tender shoots of growing brush and their favorite dessert is the most delicate ferns and flowers.

In the Sierras running through Inyo County there are three herds of mountain sheep, and these are a distinct and much larger variety than the desert sheep. People generally are not aware of the existence of these sheep from the fact that tourists seldom see them, as they are found high up in cloudland and above the localities frequented by man. The largest herd known in the Sierras can be found northeast of Independence and about ten miles away; the writer has observed this herd upon many occasions, and their number is in the near neighborhood of eighty-five to ninety, sixty-five having been counted at one time this last winter at the base of the mountains touching the valley, and within a stone's throw of an automobile road, thus refuting the popular notion that mountain sheep do not change their altitude, regardless of weather conditions.

The herd next in size may be found about twenty-five miles west of Bishop City, on Mount Tom, and numbers about forty or fifty head; they follow the snow line in winter, and, as a matter of fact come very close to the little farming community of Round Valley.

The next largest herd make their home in the neighborhood of the South Fork of Big Pine Creek, and from there on over to the rough Birch Creek and Mount Credo country; this herd consisted of about thirty head when last seen by the writer.

Of all the game animals in California the mountain sheep stand in a class by themselves; nature has provided for their welfare in many ways, having provided them with a telescopic vision and a telephonic hearing. While bold and seemingly reckless in their rock and cliff climbing, they are quick to calculate, always on the alert, and their judgment is free from error; they are very robust and strong limbed, yet very active withal, and are capable of feats of great endurance and in many ways most astonishing. Notwithstanding what many people have written and said, a mountain sheep can not and never did leap from any great height and alight upon its horns. The fact that the desert sheep are rarely found with unbroken horns is due to their using them in seasons of drouth, for prying amid the rocks and boulders in search of a certain succulent and watery bulb, called by the Indians "Sequaya," and which serves the sheep as a thirst-quencher until the springs are replenished and flow again; while in the Sierras, on the other hand, where water is plentiful, the horns are nearly always perfect to the very tips. When sheep are once pursued or fired upon, however, they can dash down an appalling declivity, touching a crevice here and there, and land in perfect safety and condition, where to the observer it would seem certain to be killed. For one to fully and really appreciate mountain sheep, they should be seen in their native home amid the grandeur of the treeless slopes, far above timber line, in the Inyo section of the grand old Sierra Nevadas.

The people of this county are duly grateful and appreciative of the splendid results achieved for them through the efforts of the State Fish and Game Commission. There is not a living stream within its borders today that does not teem with either rainbow, Eastern brook, cutthroat, Loch Leven or golden trout; at least fifty mountain lakes, previously barren of life, now hold countless millions of large Loch Leven and Eastern brook trout, and the bagging of a five-pounder of either of these high class table varieties has long since ceased to be rare enough to cause a comment, and is commonplace. The commission has well stocked seven streams in this county with trout, streams to which the fin of a fish was previously unknown, and has added to this section an asset in the way of an attraction to outside people, and in actual food value, beyond the possibility of computation or of estimation. The Chinese or ringneck pheasant, introduced into this section by the commission. has also adapted himself to his new environment and is thriving and multiplying rapidly. Inyo County doffs its hat to the California State Board of Fish and Game Commissioners!

Eastern brook trout from Big Pine Creek, Inyo County. Introduced in 1909 by Fish and Game Commission.

CONTRIBUTED ARTICLES.

ARID CALIFORNIA AND ITS ANIMAL LIFE.

By Frank Stephens.

Perhaps it may seem a little severe to term southeastern California arid, but the most distinctive character of the region I wish to indicate by this heading is its dryness as compared with the region west of the mountains. I am writing of that part of southern California east of the Sierra Nevadas and the mountains south to the state line. While a large part of this region is arid, there are localities of greater or less extent scattered through it that are less arid, either from the presence of streams or springs that furnish water for irrigation, or from a higher altitude causing a moister mountain climate. Animal life is more abundant and of greater variety in these less arid localities, but there is some life in all parts of this region. A greater proportion of it is nocturnal than in the western part of the state, and animals of nocturnal habits are more likely to be overlooked than those that are abroad in the daytime. This is the principal reason why so many people think that there is almost no animal life on the deserts. Really one does not see much life in traveling through this region, yet there is a far greater amount and variety there than a casual observer would think possible.

In a general way the southern part of this region is known as the Colorado Desert. It is the lowest in altitude, the warmest, and averages the dryest; but it also contains the largest body of cultivated land, principally under the Imperial Canal.

North of the Colorado Desert is the Mohave Desert, a plain of higher altitude interspersed with low mountains, usually isolated or standing in small irregular groups. Some of the northernmost of these mountains rise to a considerable height and carry small coniferous forests. A more or less connected range of low barren mountains divides the Mojave Desert from the Colorado Desert.

In the strict sense of being a land without animal or vegetable life, these are not deserts, as there is everywhere some animal life, and shrubs and cactuses occur, albeit sparsely in places. But in the sense used by us "old desert rats" (as the prospectors, cattlemen, frontiersmen and naturalists frequenting this region are often called) a "desert" means a land where springs and water holes are many miles apart and grass or other horse feed is very scanty or altogether lacking.

All animal life is dependent on vegetable life, hence when plants are few animal life is correspondingly scanty. But the plants of this region sprout their seeds quickly, grow rapidly and mature early when showers do come, and showers are quite likely to be heavy though brief. Then many annuals quickly appear that soon ripen a quantity of seeds that furnish food for many small mammals and some birds. If the rains happen to come at short intervals and extend over several weeks, the "desert" becomes a brilliant flower garden. Then the desert is a paradise for botanists, entomologists and other naturalists. Plants and insects of many species appear, live a brief life and disappear, for years perhaps. This fullness of bloom happens but rarely, however. I have seen it at its best but twice in many years.

MAMMALS.

Deer are found only near the border of arid California, the deserts being unsuited to their wants. Formerly some burro deer lived along the Colorado River, but the settlers and prospectors have practically exterminated them there. A few California mule deer range down the eastern slopes of the mountains bordering the western side of the deserts.

I do not think that antelope were ever plentiful in this region, but I once saw four antelope where Carrizo Creek opens out to the Colorado Desert, and I have seen fresh tracks of antelope many times in the southern part of this desert. As near as I can learn no antelope has been seen in that part of the Colorado Desert north of the Mexican boundary for seven or eight years. I am told that a few still survive near Lake Maquata in northeastern Lower California, and an occasional individual might wander north as far as the boundary. A small band of antelope still live in Antelope Valley, which is the western end of the Mojave Desert. This band is carefully protected, and is the only one I know of in southern California.

Bighorns (mountain sheep) still live in eastern California. The subspecies of the desert mountains is the Nelson bighorn, *Ovis canadensis nelsoni*. Recently (1912) Dr. Joseph Grinnell described a new race from the Sierra Nevadas as the Sierra Nevada bighorn, *Ovis canadensis sierræ*. It is probable that the few bighorns living in the San Gabriel and San Bernardino Mountains belong to the latter race, as Nelson bighorns prefer a warmer climate, being seldom found as high as 4,000 feet above sea level, while the Sierra Nevada bighorns live mostly above 8,000 feet altitude.

Among the rough and almost inaccessible canyons and spurs of the eastern slope of the coast range of mountains in San Diego and Riverside counties, and in the desert hills and low mountains of eastern Riverside, San Bernardino, Inyo and Imperial counties, Nelson bighorns occur in small bands or singly. There are few large bands left. Those remaining maintain a precarious existence by constant watchfulness. Their natural enemies aside from man are few. Cougars (mountain lions), that are so destructive to bighorn lambs in the Rocky Mountains, do not occur at all in most of this region, and are very rare along the Colorado River and on the eastern slope of the coast range. Nor do golden eagles do much harm to the lambs. Coyotes kill an occasional lamb or an isolated wounded adult, but adult bighorns, especially if in a small band, are able to fight coyotes away. But bighorns can not cope with man. Sportsmen do not now kill many bighorns, but prospectors, ranchmen and Indians do kill many, in season and out of season, male and female. Most prospectors contend that they have the moral right to kill game for food whenever they have the opportunity. Travelers and outlying ranchmen pick them off occasionally; Mojave and other Indians kill some. Among them they make life exceedingly hazardous for bighorns. The frontier people particularly resent entire restriction of hunting. I believe that if a brief open season was allowed the closed season would be better respected, no more bighorns would be killed than now, and it would be much easier to educate the people to respect the closed season. With all this destruction, I believe that bighorns are nearly holding their own, and if poaching was stopped their numbers would begin to increase slowly. There is a large area of rough hills

A "desert rat." (Photo by courtesy of Mr. Frank Stevens.)

and low mountains in southeastern California that is well adapted to the wants of bighorns, that can never be utilized for agricultural purposes for lack of water. Its principal value at present is as a prospecting ground for minerals. By thorough protection the number of bighorns in this region could be steadily increased, and ultimately this could be made a fine hunting ground.

The food of bighorns is of a coarse nature, mostly the leaves and twigs of shrubs, or a very coarse kind of desert grass called *gietta*. Bighorns go to water nearly every day in warm weather; but if disturbed at the springs, or if they become suspicious of the presence of men at the springs they may go without water for several days. At such times they eat the large cactuses that grow in this region. The Indians tell me that they sometimes get in the habit of eating these cactuses and then go without drinking for a long time in cool weather.

Six species of squirrels live in arid California, all being ground squirrels or chipmunks. Some of these squirrels are troublesome to farmers through depredations on crops. No tree squirrels or flying squirrels live in this region as there are no extensive forests.

Formerly beavers were common along the Colorado River, but they have been trapped so relentlessly that they have become quite scarce. If they were thoroughly protected a few years they would again become common. Notwithstanding the warm climate in which they live the fur of these beavers is fairly good because the water of the river remains cool most of the year.

Muskrats occur here and there along the Colorado River, but are not common. I am told that they have followed down the Imperial Canal and have become quite troublesome by causing breaks in the canal. They are likely to always be troublesome in such canals as it is not practicable to entirely exterminate them. Their fur is poor.

Mice and rats, of many species, are the most abundant mammals of arid California. A locality must be barren indeed if mice are unable to find food in it, and the mice of this region are hardy. In favorable places they become very abundant, particularly pocket mice and pocket rats, which have developed the habit of storing food in the season when it is most abundant. The list of species of these two groups foots up thirty for arid California. Of course no one locality has half of them.

Desert jack rabbits are widely distributed, though sparsely in the more barren parts. Arizona cottontails are common in the Colorado River bottoms, and in various places where brush is plentiful enough to make sufficient cover. They are lacking in wide areas of the more barren parts of the region.

Desert wildcats (lynx, bobcats) are found along the Colorado River and along the old channels running from it into Salton Lake, and less commonly in brushy localities in the foothills and low mountains. They prey on rats, mice, cottontails, etc., and once in a while on poultry.

Yuma cougars (puma, mountain lion) are rare inhabitants of the Colorado River bottoms, not occurring west, according to our present knowledge of their distribution. The Pacific cougar occurs in the foothills bordering the deserts on the west, but is becoming quite rare. They prey on squirrels, rats, mice, rabbits, and occasionally on hogs, fawns and bighorn lambs.

Coyotes are common everywhere in arid California. They prey on cottontails, jack rabbits, ground squirrels, rats and mice, and such insect life as grasshoppers and beetles. They catch a small amount of poultry at isolated ranches and the borders of settlements, but on the whole they do the farmer more good than harm, as they help keep in check harmful insects, ground squirrels, gophers, etc. Certainly no bounty should be paid for the destruction of coyotes.

Foxes of two species live in this region. The desert kit fox is a yellowish colored animal inhabiting the open desert. Its prey is almost entirely rats and mice. The Arizona gray fox is common in the timbered bottom lands along the Colorado River. They are easily trapped.

Raccoons are abundant along the Colorado River and the old overflow channels in Imperial Valley. They eat fish, frogs, rats, mice, fruits and seeds. Their fur is moderately good in winter.

A very few badgers are scattered through arid California.

Sonora otters are rare along the Colorado River. Trappers look closely for their signs and occasionally get an otter there.

Arizona skunks are common along the Colorado River and the old channels. A few spotted skunks live in the same region.

Bats are more or less common in their season in arid California, and are abundant at times around water.

Altogether about sixty-five kinds of mammals are native to arid California.

BIRDS.

About two hundred species and sub-species of birds are known to be found in arid California at some season of the year. About thirty-five of these are practically resident all the year. Most of the water birds are present only in winter. Over a large part of this area water birds are necessarily lacking, yet even small ponds and springs are visited by migrating ducks at times. The muddy waters of the Colorado River are not inviting to water birds, but the sloughs and ponds of the flood channels of the lower river afford clearer water, and are visited by great numbers of water birds in winter, more particularly those in Lower California, where the birds are not harassed by hunters so much.

Sea birds of course do not visit this part of California, and loons, grebes and gulls are not common. White pelicans sometimes appear in large numbers in winter. I have seen flocks covering several acres standing thickly on sand bars a few miles south of the boundary. A dozen species of edible ducks occur. They are most common south of the boundary, but a considerable number are to be found along the overflow channels and on the main river in California. Geese are of irregular occurrence in this region and are seldom abundant.

Wood ibises come up the Colorado River in summer after their breeding season along the Gulf of California is over. I have seen large flocks in August a hundred miles above Yuma. These large birds are not used as food. I do not know that they do any harm, unless possibly by eating the young of edible fishes. They appear to glean their food entirely from the water. Herons of several species are found, but rarely away from the big river or its overflow channels. Shore birds are comparatively few, for lack of suitable feeding grounds.

Three species of quail are found in arid California. California valley quail are limited to the foothills along the western border of the deserts, and the partly timbered mountains of the northern Mojave Desert. In some of these mountains nice coveys used to be found at some of the springs. Mountain quail also occur at many of the same places in smaller numbers. I have even found mountain quail in thin growths of juniper. They seem more independent of water than valley quail. Gambel quail are often abundant along the Colorado River and about the overflow channels, though their numbers are now being greatly lessened around the settlements by steady hunting. The ranges of these three species meet at the western end of the Colorado Desert. I have shot hybrids between valley and Gambel quail there, and I have seen hybrids between mountain and Gambel quail that were shot on the northeast slope of the San Bernardino Mountains.

Mourning doves are found occasionally in summer at springs and water holes, and more commonly along the Colorado River.

Hawks are usually scarce throughout this region, as are owls, though great horned owls are somewhat more common where they can find shelter in crevices in cliffs.

Woodpeckers are scarce away from the mountains and the timbered river bottoms, and are not very plentiful even there.

In certain places hummingbirds are common when flowers are in bloom. Four or five species occur, though two are only migrants.

Flycatchers are not common, for lack of insect food. The male of one species, the vermillion flycatcher, is conspicuous from its bright red colors.

Ravens are widely distributed in arid California. They are usually seen in pairs, and probably remain paired permanently. When it is time for travelers to break camp in the morning and move on, a pair of ravens are likely to appear and perch on some shrub near, to wait patiently until the travelers have gone, when they thoroughly glean any scraps of food or grain that the party may have left around the recent camp. Jays are unknown in most of this region.

Blackbirds, orioles and meadow larks are ordinarily found only along the river bottoms and around the irrigated land.

About twenty-five kinds of sparrows are found in this region, mostly as migrants or winter visitors. Swallows are common in but few places. The smaller insectivorous birds are mostly only transient migrants.

Wrens are few, the cactus wren being the most conspicuous species. Crissal thrashers are common in the thickets of the river bottoms, and the rare LeConte thrasher is sometimes seen out in the desert, where it is a permanent resident.

On the whole, birds are not plentiful, as might be expected in so barren a country.

FISH.

Fish of course are scarce in a region so deficient in streams as this is. As a matter of fact no edible fish are found in arid California except in the Colorado River and in the sloughs and ponds supplied by it. Even in the Colorado River native fish are not abundant, as the water is so muddy as to make it unfit to support most kinds of fish. There are some carp and catfish, the descendants of introduced fish. There are very small fish, like small minnows, in many of the permanent springs of arid California, particularly in the warm springs. These little fish are of several species, and sometimes two or three species live in the same spring. It is a problem how these little fish became so widely disseminated in isolated springs.

SNAKES.

Snakes are not abundant in arid California. Perhaps rattlesnakes are the most common species, though they are not nearly as common as when I first knew the desert, nearly forty years ago. Every one kills rattlesnakes wherever found, and this steady destruction has decidedly lessened their number. The small rattlesnake known as the "sidewinder" is peculiar in its mode of locomotion. It moves side-wise or diagonally to the direction which it faces. It is dreaded by the "desert rats" because it gives so little warning; its rattle is small and is little used, while the larger species sound their rattle on slight provocation. Several other species of snakes live in this region.

LIZARDS.

Lizards are comparatively abundant, both in species and in individuals. Several prospectors and cattlemen have told me that they had seen the big lizard known as the "Gila monster" in southeastern California. A little questioning usually convinced me that the lizard really seen was the "chuckwalla," another large lizard that is rather common in rocky places in the Mojave Desert, and is occasionally found in the foothills bordering the Colorado Desert. I know of no reliable record of the occurrence of the Gila monster anywhere in California. It is the only poisonous lizard found in the United States. The desert Indians formerly ate chuckwallas and other large lizards, and to some extent do so yet. White men laughed at them for eating lizards and rats, and now they do not like to be seen eating such things, although they are really as clean and wholesome as squirrels and rabbits.

The border of the desert. (Photo by courtesy of Mr. Frank Stevens.)

TORTOISES.

Agassiz tortoises inhabit arid California. They are found most often on the mesas west of the Colorado River, but I have never seen them plentiful even there, and farther west they are rare. The Indians eat them, and so do the white settlers sometimes. I have seen teeth marks of coyotes on their shells, but the shells generally prove too hard for the coyotes. These tortoises are exclusively vegetarian. They are able to become dormant for weeks at a time when green food is scarce, and in cold weather. They are principally nocturnal, in hot weather at least.

THE CALIFORNIA FISH INDUSTRY FROM A COMMERCIAL POINT OF VIEW.

By F. E. Booth, Secretary, Sacramento River Packers' Association and President, Monterey Packing Company.

Much has been said in the press of the state about a so-called "fish trust," which has, it is stated, arbitrarily raised the price of fish to the housewives, until fish is a higher priced article of food than the choicest beef cut.

Thousands of our good citizens have really believed this, and some are even satisfied that this charge has been fully proven. They recall the time when shrimps and cracked crabs were served free, as an appetizer, at many of the old-time restaurants; when a whole cooked crab could be bought for 10 cents; when salmon were so plentiful on the Sacramento River that the steamboats refused to haul them from river receiving points to San Francisco, unless the freight charges were prepaid. They can remember visiting the beach at old Harbor View and watching the always picturesque fishermen, hauling in their beach seines, and usually with a mass of all kinds of good food fish, including many dozens of crabs, at each haul. Fish were so plentiful then that any one could help himself, without objection from the fishermen.

Now all this is changed, and the old-timers, without trying to find the real cause, accept without question, or the slightest investigation, the first explanation that any irresponsible person may make. Hence, the cry of "fish trust" was taken up and believed, and is, unfortunately, still believed by many to be the cause of high prices.

The purpose of this article is to put the commercial fishing business right up to the reader, and let him draw his own conclusions.

Any person, after a moment's thought, will admit the following to be true, almost from his personal knowledge of the situation. First, that if he eats fish at all, it is almost always on Friday, and at no other time; second, that he eats fish not so much for its food value as for a change in diet, or because of church edicts.

Statistics show that 80 per cent of the fish business is done on Friday, and 15 per cent on Wednesday (both days being observed by certain religious denominations, as fish days), the remaining 5 per cent being scattered over the other four business days in the week.

It requires no great knowledge of arithmetic to figure out a tremendous additional increase in the cost of fish from this very fact. A retail fish dealer must, therefore, get practically all his week's expenses and profits from his Friday sales. This necessarily means 50 to 100 per cent added to his cost.

Another thing, which is altogether wrong, is that most of the retail fish business is carried on by persons selling practically nothing but fish, and it is imperative that they get these higher prices to make even ordinary wages. The economical course would be for butchers or grocers to be the distributors of fish, for their expenses would be no greater than when handling meats or groceries. Some butchers do sell fish, and they could *afford* to sell, for at least one half of their asking price. But why should they, they argue? Their neighbor (the exclusive fish store) gets from 20 cents to 25 cents per pound for fish, so why shouldn't the butcher? Not a bad argument, and one you would probably use.

Once more they argue, a woman will only buy 50 cents to 60 cents worth of fish per week, anyway, and she doesn't care what it costs per pound. Still once again, the housewife phones her fishman, and nine times out of ten wants that variety of fish which she can prepare with the least trouble and which has the least waste in bone or skin. So she orders halibut or salmon, or striped bass.

A thoughtful reader will see right here one of the reasons for advanced prices to the retailer.

The population of the cities throughout the state has doubled and quadrupled within a comparatively few years. This has directly increased the demand for fish, and certain kinds, notably salmon, have not increased with the population. In fact, as population has increased and encroached on the spawning grounds of the salmon, it has automatically lessened the natural increase of the salmon. Had it not been for the artificial propagation of salmon in all these last twenty-five years, it is reasonable to suppose there would not now be a single salmon left in the Sacramento River. As it is, the supply is tremendously bigger than most people think, for the increased consumption in the fresh fish market requires an enormous supply of salmon. The fall run of salmon is probably as big now as it used to be, although it is not so apparent owing to the enormous demand.

Striped Bass.

One of the most popular of all the river fish, the striped bass, was originally introduced by the Fish and Game Commission from the waters of the eastern part of the United States. Evidently it liked the new surroundings, for its increase has been marked. The present laws regarding the catching and sale of this fine fish seem most wise and effective. This fish is usually high priced, as it is a fine shipping fish, firm and a good carrier, and justly popular. It matures in salt water, returning each year to fresh water for spawning purposes, after which it again returns to salt water.

Shad.

This is another transplanted eastern fish, which, like the striped bass, has increased rapidly in the Pacific waters. But there the comparison ends, for the fish has not met with popular favor. It is esteemed most highly in the eastern markets, the wholesale price running from 8 to 10 cents per pound. It is admitted that the Pacific fish is in every way as fine as the Atlantic variety, but people here will not eat it, even at a retail price of 5 cents per pound, cleaned and delivered to the house. Their principal use now is to strip them of the roe and salt the rest of the fish. It is hard work to sell them salted at 1½ cents per pound, dressed, dried weight, boxed and delivered, f. o. b. to the China steamers. The Chinese exporters are practically the only ones handling the salt fish.

Catfish.

Here, again, is an example of what success the Fish and Game Commission has made of an imported fish. The catfish is entirely a fresh water fish, and has found a home to its liking in the California waters. For several years it was a despised little fish, too plentiful to be considered good for anything, and neglected accordingly. Gradually, however, its worth became known and it came into its own. Over fishing necessitated special laws regarding size to be taken, kind of nets to be used, etc.

Crabs.

This dainty sea food has before been mentioned in this article. Twenty-five years ago, these fish were sold for from 40 cents to 50 cents per dozen. Now they command from $2 to $2.50 and even $3 per dozen. This advance is occasioned by two factors: *First,* an extraordinary demand owing to a large population; *second,* to a combination among the crab fishermen's union, which imposes a limit on the number of crabs that can be taken in one day, and the price they must be sold for.

Shrimps.

The bay is said to be as full of shrimps now as it ever was, yet comparatively few are being caught. Here is the reason: There is only one "best" way of catching shrimps, at least only one "best" *known* way, and that is with a Chinese shrimp or bag net. This is so constructed that it not only catches shrimps of all sizes, but everything else that is alive that comes its way. It is an accepted theory that the young and immature fish of most every variety of salt water fish live right in among the shrimps. This is most unfortunate, for the taking of shrimps is very desirable. The destruction of countless millions of baby food fish is, however, not to be tolerated. After years of fighting the Chinese shrimp interests, the Fish and Game Commission finally got a law passed prohibiting the use of the Chinese shrimp net, and this has automatically stopped shrimp fishing, since no one seems to have found out how to take shrimps with any other kind of net. This will be discovered some day, however.

As a matter of fact, not over 5 per cent of the shrimps formerly caught were used in the local market, the balance being dried and shipped out of the country. A careful account kept of one week's catch of the baby fish showed 100 tons to have been wasted by the destruction of these fish in the shrimp nets, equal, perhaps to 1,000 tons at maturity. The Fish and Game Commission never did a better thing in its career than to get the present law passed. Of course, great effort will be made to have this law repealed.

Crawfish or California Lobster.

Many people think this fish fully as fine as the eastern lobster. Certainly it is worth preserving, and it has taken endless patience and tact to have the present laws passed. The people do not care to eat the large sized crawfish, and as this is the real breeder, it was made illegal to take them over 13½ inches long. This is as it should be. A 14 inch female lobster produces about ten times as many eggs as a 7 inch female. The present law permits the importation into California of the Mexican lobster, under the supervision of the Fish and Game Commission. This is as it should be, for it not only gives our people the privilege of having lobster, but it also protects California's supply. It is true that some of the California lobster fishermen are trying hard to have the law changed so as to exclude the Mexican fish, claiming that if no Mexican or Lower California lobsters came in the price of the California lobsters would double.

Soles, Sand-dabs, and Flounders.

These are the principal supply of fish in the San Francisco and Bay cities markets. They are caught almost entirely by trawlers, fishing outside the Heads, and frequently twenty-five miles off shore. They are the freshest of all fish sold on the market, for the trawl boats go out every day except Saturday, returning the same night. Furthermore, they are, with two exceptions, shad and carp, the cheapest of all the fish sold in San Francisco. They seldom bring more than 3 to 4 cents per pound; so when the retailer sells you this variety of fish at from 20 to 25 cents per pound, you may know he seldom paid more than 4 cents for it.

The Italian name of the net used in this trawl fishing is *paranzella*. It sounds pretty forbidding, but is nothing more nor less than a drag net, weighted to go nearly to the bottom and in very deep water, and is dragged usually between two power boats. This kind of fishing has been going on here for over forty years, with no apparent diminution of fish,

Halibut.

A large flat fish like a sole or flounder, but frequently weighing over 100 pounds. It is caught principally in Alaska, where it is cleaned and iced and shipped to San Francisco, where it finally finds a market from two to four weeks after it is caught. It has no particular merit, except an absence of bones, and is therefore easily served and popular with the "hurry up" housekeeper.

Chicken Halibut.

A small size edition of the halibut of Alaska, but caught in southern California waters. It is sold the day after it is caught. In Los Angeles they prefer the chicken to the genuine halibut, which is where they show good judgment.

Barracuda, Sea Bass, Spanish Mackerel, Yellow Tail.

All these fish are, more properly speaking, southern California fish, although some of the varieties frequently get as far north as San Francisco Bay. At certain seasons, Monterey Bay gives up good catches of these fish. They are a popular table fish, and usually not very high in price.

Albacore.

A species of tuna, caught in southern California waters, and during the season very abundant. They are not at all popular as a table fish, but are principally used for canning. This industry has grown beyond belief and promises to tax the fish supply. The merit of the canned fish is unquestioned and the demand is constantly expanding.

Compulsory salting of stock on U. S. National Forest. Salting done at definite places, which

THE NATIONAL FORESTS IN CALIFORNIA.

By W. C. HODGE, Forest Examiner, U. S. Forest Service.

From the earliest times forestry has been associated with the protection of game. In the year 1598 the Englishman, Manwood, in his treatise on the "Laws of the Forest," defines a forest as "a certain territory of woody grounds, fruitful pastures, privileged for wild beasts and fowls of forest, chase, and warren to nest and abide in, in the safe protection of the king." Since Manwood's time the functions of the forest have greatly increased, so that instead of being solely valuable as a pleasure ground they are now chiefly valuable for the production of wood and the conservation of water. But their usefulness for recreation purposes is still extremely great, and although the production of timber and the maintenance of the water supply will henceforth outrank in importance the game production feature, this last will always continue to be a valuable resource.

As a forest was formerly a game preserve, so a forester was formerly a gamekeeper. With the shifting of the functions of the forest came about a change in the duties of the forester. Nowadays, although the function of game protection is still important, it is subordinate to the work of forest administration and forest protection.

National forests are set apart to insure a perpetual supply of timber for the use and necessities of the people of the United States, and to prevent destruction of the forest cover which regulates the flow of streams. They "are open to all persons for all lawful purposes. The timber, water, pasture, and other resources are for the use of the people, and the minerals are open to exploitation just as on unreserved public land. * * * Twenty-five per cent of all receipts from national forests are given to the counties in which they lie, to be used for schools and roads. An additional ten per cent is expended by the Secretary of Agriculture upon roads and trails constructed primarily for the benefit of settlers within the forests."*

Between July 1, 1913, and June 30, 1914, receipts from the national forests in California amounted to $261,415.44. This revenue is derived from the sale or lease of the resources contained in the forests, the administration and protection of which constitutes the principal work of the service.

In California there are eighteen national forests. Their average size is one and one half million acres, and they include the roughest and most mountainous portions of the state. The areas selected for national forests are of two kinds: those actually or potentially valuable for the production of timber, and those whose cover is valuable chiefly for its effect on stream regulation. In southern California water conservation is the principal function; in northern California timber production is the most important; but all of the national forests serve both purposes to some extent.

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*The Use Book: A Manual for users of the National Forests. July 1, 1913. Copies may be obtained free of charge on application to the District Forester, 114 Sansome street, San Francisco.

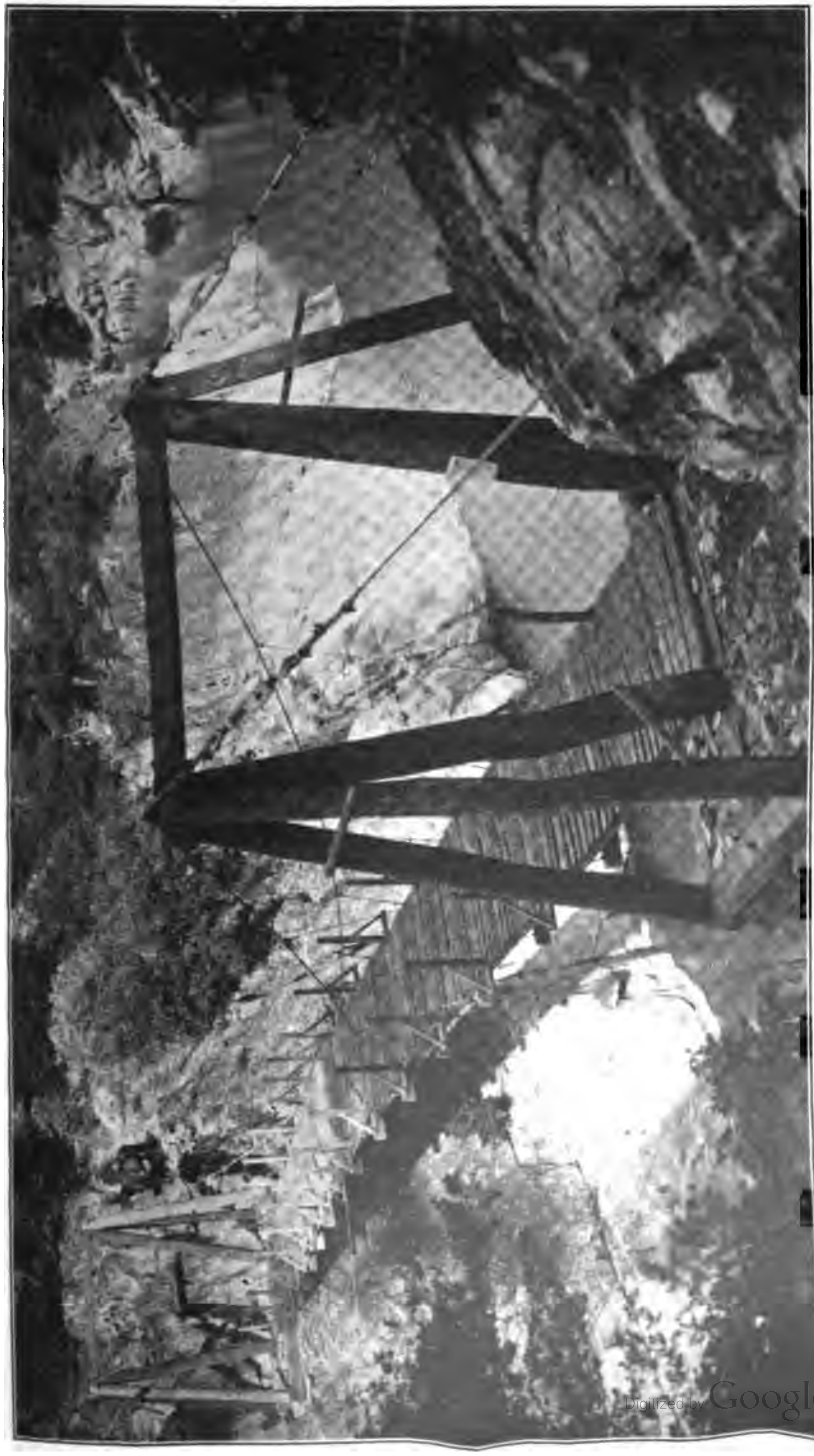
Originally the national forests were called "forest reserves." The name was changed in order to bring out more clearly the point that the resources of the forests are to be used. The national forests are "reserved" in the sense that certain of the land laws which apply to the public domain are not effective on the forests; but none of the resources are reserved from use except in occasional cases where one use is incompatible with another.

All mature timber in the national forests which may be cut with benefit in accordance with the principles of forestry is for sale and will be offered as demand arises. Only stumpage is sold, the title to the land remaining with the government. Timber may be sold in amounts ranging from a few thousand feet up to whatever amount may be necessary to warrant the investment required for constructing a railroad or other means of transportation into comparatively inaccessible regions. Forage resources are sold under regulations whose leading objects are the protection and conservative use of all national forest land adapted for grazing; the permanent good of the live stock industry through proper care and improvement of grazing lands; and the protection of the settler and home builder against unfair competition in the use of the range.

Claims can be initiated upon lands within national forests only under the mining laws, the coal land laws, and the forest homestead act. Prospecting is not interfered with in any way. Free use of timber is granted to bona fide miners and prospectors who may not reasonably be required to purchase and who have not on their own claims a sufficient or practically accessible supply.

The use and occupancy of the agricultural lands in the forests is desired from every standpoint. Every added home helps in the upbuilding of the country. The forests are to serve the people in a permanent development of homes and industries. In addition, the settler is a great help—practically a necessity—in the protection and development of the forest itself. Every cultivated field is a fire-break; every ranch is a vantage point to prevent and fight fires; every settler may become a forest protector.

The national forests contain waterpowers of great value, the aggregate capacity of which is estimated at 12,000,000 horsepower. Permits for the development and use of these water powers are granted under



U. S. Forest Service bridge over American River, El Dorado National Forest. (Photograph by courtesy U. S. Forest Service.)

regulations which seek to prevent the appropriation of power sites for speculative purposes; to secure prompt and full development; to prevent monopoly; and to secure a reasonable compensation to the government for the use of the land occupied and the beneficial protection given to the watershed.

The administration of these various resources and the protection of the forests especially from fire constitute the principal work of the forest officers.

The national forests contain the principal habitats of all the important game animals of the west. No charge is made for hunting, fishing, or ordinary camping upon government land within the national forests and their use as recreation grounds is encouraged. No permits are issued for game preserves or any use of land which would result in preventing or restricting lawful hunting or fishing. Since game in general is regarded as under state control, the federal forest officers derive their authority in game protection from the state. They are not game wardens ex officio but only after appointment as such by the proper state authorities. National forest officers are, however, active in game protection, the policy of the government in this respect being expressed in the following regulation of the Secretary of Agriculture:

> All forest officers will cooperate with state or territorial officials, so far as they can without undue interference with their regular forest work, to enforce local laws for the protection of birds, fish, and game. When properly authorized to do so they will act *without additional pay* as deputy game wardens with full power to enforce local laws, but *may not accept any fees or rewards or parts of fines* on account of the enforcement of the state game laws. Forest officers and employees may, however accept any bounties voluntarily offered by any state or county or any association or individual for the destruction of predatory wild animals.

This is supplemented by the following instructions:

> Wild game adds materially to the enjoyment of the national forests by the public, and the preservation of game animals, birds, and fish is a public duty. This duty, however, rests primarily with the state. It is incumbent upon the forest service, under the act of May 23, 1908, to render all reasonable assistance in the protection of game within the national forests, but the service must be governed in its enforcement of the game laws by the attitude of the state officials. Furthermore, such assistance must be subordinated to the regular protective and administrative work of the forest service.

Acting under these instructions and in cooperation with the State Fish and Game Commission, the forest officers on 27,000,000 acres of national forest lands are fulfilling the duties of game wardens in California.

The administration of the national forests and the conduct of all matters relating to forestry which have been placed upon the Department of Agriculture by congress are under the direction of the Secretary of Agriculture, in charge of the Forester, who is chief of the Forest Service. The office of the Forester is in Washington, D. C.

For the better administration of the national forests, six districts have been established, each of which is in charge of a district forester who is aided by several assistant district foresters and specialists in various branches of the work.

District 5, which includes California and western Nevada, has its headquarters at 114 Sansome street, San Francisco, California.

Each national forest is in charge of a supervisor who plans the work on his forest under the instructions of the district forester and supervises its execution. His headquarters is located in a town conveniently situated with regard to his forest. Routine work involved in the supervision of timber sales, grazing, free use of timber, special use, and other contracts and permits, the carrying out of the protection and improvement plans, and other administrative activities, is performed by rangers. Each forest is divided into ranger districts of such size that, under ordinary conditions, all the regular work can be handled effectively by one fully equipped ranger with the necessary temporary assistants. The average ranger district has about 60,000 acres, but where means of travel and communication are good, or where there is only a small volume of business or the fire hazard is low, very much larger districts may be established.

From the sportsman's point of view, the most important activity of the forest service outside of the enforcement of the game laws is the protection of the forests from fire. The fire risk in California is excessive. The long dry season, the inflammable nature of the cover, and the habit, natural to California, of camping out during the summer, tend to produce severe fire conditions. The matter of camping is mentioned for the reason that most fires are of human origin. The seasoned camper is by no means a source of fire danger; he is, rather, a safety factor since he knows what precautions must be taken and helps to instruct those who are less experienced. But until a camper has had at least a season's experience in the forests he is apt to take unwarranted chances with camp fires, matches, burning tobacco, etc; and, speaking generally, the more people there are in the forests the greater the risk.

The fire organization on the national forests includes measures designed to prevent, detect, and suppress fires. Absolute prevention is, of course, impossible; lightning causes a certain percentage of fires each year, and a few fires start in other ways that may be fairly called unpreventable. Among these are the breaking of transmission lines, the accidental burning of houses in the forest, etc. There is also a theory very popular in California that broken bottles, by focusing the sun's rays upon inflammable material, are a frequent source of fires, but the theory has never been verified. During seven years in which accurate fire records have been kept in California, not a single case of this sort has come to light.

Preventable fires can be prevented only by educating the public. This the service attempts to accomplish by various devices but especially by giving currency to the following Six Rules:

1. **Matches.** Be sure your match is out. Break it in two before you throw it away.

2. **Tobacco.** Throw pipe ashes and cigar or cigarette stumps in the dust of the road and stamp or pinch out the fire before leaving them. Don't throw them into brush, leaves, or needles.

3. **Making Camp.** Build a small campfire. Build it in the open, not against a tree or log or near brush. Scrape away the trash from all around it.

4. **Leaving Camp.** Never leave a campfire, even for a short time, without quenching it with water and then covering it with earth.

5. **Bonfires.** Never build bonfires in windy weather or where there is the slightest danger of their escaping from control. Don't make them larger than you need.

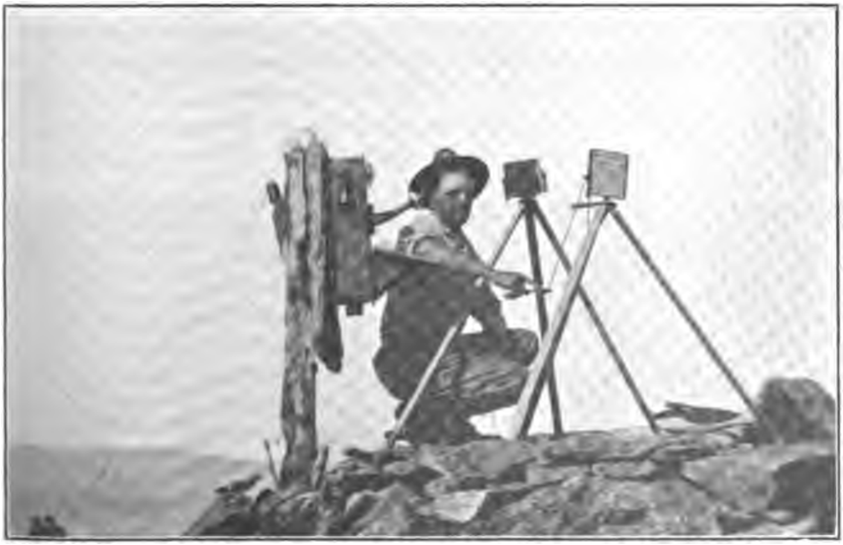
6. **Fighting Fires.** If you find a fire, try to put it out. If you can't, get word of it to the nearest U. S. Forest Ranger or State Firewarden at once. Keep in touch with the rangers.

The work of detecting and suppressing forest fires has been greatly systematized in recent years. Nowadays fires are reported mainly by lookouts whose function is not to fight fires but merely to discover and report them. The lookouts are located on commanding peaks, and remain on duty continuously. They are equipped with the necessary instruments and housed in cabins from the interior of which the entire area under protection can be kept in view. Each forest has several lookouts. Where the same area is under observation from two or more, the location of a fire can be determined very accurately even at a distance of many miles from either.

The lookout is in communication with the ranger either by telephone or by heliograph. Telephone service is the most certain and satisfactory but heliographs are used in situations where other facilities are lacking or are too costly. On receiving a report from a lookout, the ranger in whose district the fire is located takes immediate steps to put it out. His assistants are stationed at various strategic points each connected by telephone, and they remain within hearing distance of the bell. In fighting a forest fire it is as necessary to be prompt as it is in saving a burning house. For this reason the forest firemen are kept at their stations in constant readiness. This system has proved to be very economical. Instead of having large fires to fight, the majority of fires are kept to an area under one quarter of an acre and are handled by one or two men at the most.

Where large fires occur, due to exceptional circumstances, large bodies of fire fighters may be required. These are as far as possible organized in advance so that no time may be lost. They are recruited from near-by ranchers, stockmen, lumbermen, and even from the settlements outside. Transportation facilities both for the men and for their subordinates are also arranged beforehand, and tools and nonperishable food supplies are cached in places where a demand for them is likely to arise.

In the more thickly settled portions of some forests, especially where there are numerous occasional visitors from near-by towns, moving patrolmen are employed. These, by calling the attention of campers to the necessity for taking proper precautions, and even by their very presence, keep a great many fires from starting. They also attend to the extinguishing of such fires as occur, and in the case of large fires take charge of the fire fighting until their superiors relieve them.



Junction of phone and heliograph systems on national forests.
(Photo by courtesy U. S. Forest Service.)

The system thus briefly described handled 1,628 fires on the national forests of California during the season of 1913. This was an exceptional year for electric storms, lightning having caused 804 fires or nearly half the total. Thirteen per cent of the fires were caused by campers. The total area of forest burned was a trifle less than 90,000 acres, 10,418 acres being timber land and the remainder brush or grass land. Only 275 fires attained an area of 10 acres or larger and 912 were caught and put out before they had covered a space 100 feet square.

One additional phase of fire protection work should be mentioned, namely, the safeguarding of dangerous areas either by reducing their inflammability or by constructing fire lines around them. Obviously the simplest way of cleaning up considerable areas that are in dangerous condition is by the careful use of fire. The debris resulting from the cutting of timber under the timber sale regulations would form a serious menace to the young growth from which the future forest will be derived unless it were disposed of somehow. The usual practice is to require that the purchaser of government timber pile the brush, tops, limbs, and other debris in piles of suitable size which are fired at the proper season by the rangers.

A few years ago the opinion was very prevalent in California that the entire forest area should be burned over periodically in order to effect a general clean-up. This theory is now very largely discarded, and properly so. There are certain arguments in favor of it but it is chiefly based upon conceptions that are fundamentally wrong.

In the first place, although it appears to cost nothing, it is in reality an extremely expensive measure when performed effectively. Advocates of this theory—the so-called "light burning" theory—assume that it is only necessary to touch off a piece of forest at the proper season and that the fire will do its work without further attention. This is by no means the case. It is obvious that there are many areas that fire should be kept out of at all hazards, or, if they are to be burned at all, should be burned with extreme care. This means, then, that the fire must be kept under control, which would entail prohibitive expense as compared with the cost of keeping fires out entirely. One large tract in the northern Sierras was cleaned up in this fashion at a cost of 50 cents per acre. At the same rate, the expense of light burning the whole of the yellow pine belt in California would amount to at least $5,000,000.

"Making trail" in the U. S. National Forest. (Photo by courtesy of U. S. Forest Service.)

But besides the prohibitive cost there are two other objections to this practice. One is that the young growth is inevitably destroyed; in fact, since thickets of young growth are specially inflammable, it is one of the objects of light burning to consume them. But the forests of the future can not be created all at once when they are needed. They require a development period of at least one hundred years before they produce material fit to cut into lumber. Any system which protects the mature timber at the expense of the young growth which is to replace it violates the principles of forestry, and, unless the sacrifice is absolutely unavoidable, of common sense as well. It was formerly argued that the sacrifice was necessary; that unless the debris which collected on the floor of the forest year after year was burned, unless the thickets of young growth were kept down, the final result would be a conflagration that nothing could control. This argument upon examination, is found not to hold. The record of the forest service in California during the last year proved that very severe fire conditions could be handled without any considerable loss of timber.

But, what is still more important, it is found by experiment that burning decreases the amount of litter not for a period of years but at most for an interval of a few months. The litter upon the ground at the time of the burning is consumed, but is replaced with more than normal rapidity by the debris shed from the trees scorched by the fire.

In short, light burning, in order to make the forest safe against future fires, must not be "light" but must be a fire of exactly the sort that it is the object of the practice to prevent. Fortunately the light burning method is no longer advocated to any great extent.

United States Department of Agriculture.

Forest Service—District 5.

CALIFORNIA AND WESTERN NEVADA.

District Forester, COERT DUBOIS; District Office, 114 Sansome Street, San Francisco.

National Forest.	Forest Supervisor.	Headquarters.
Angeles	R. H. Charlton	625 Federal Building, Los Angeles, Cal.
California	M. A. Benedict	Willows (winter), Oriental (summer), Glenn County, Cal.
Cleveland	S. W. Wynne	Escondido, San Diego County, Cal.
El Dorado	E. W. Kelley	Placerville, El Dorado County, Cal.
Inyo	A. H. Hogue	Bishop, Inyo County, Cal.
Klamath	W. B. Rider	Yreka, Siskiyou County, Cal.
Lassen	W. J. Rushing	Red Bluff (winter), Mineral (summer), Tehama County, Cal.
Modoc	W. G. Durbin	Alturas, Modoc County, Cal.
Mono	W. M. Maule	Gardenville, Douglas County, Nev.

Monterey	N. H. Sloane	Arbolado, Monterey County, Cal.
Plumas	D. N. Rogers	Quincy, Plumas County, Cal.
Santa Barbara	C. E. Rachford	Howard-Canfield Building, Santa Barbara, Cal.
Sequoia	A. B. Patterson	Hot Springs, Tulare County, Cal.
Shasta	R. F. Hammatt	Sisson, Siskiyou County, Cal.
Sierra	P. G. Redington	Northfork, Madera County, Cal.
Stanislaus	R. W. Ayres	Sonora, Tuolumne County, Cal.
Tahoe	R. L. P. Bigelow	Nevada City, Nevada County, Cal.
Trinity	W. A. Huestis	Weaverville, Trinity County, Cal.

THE AMERICAN ARMY OF HUNTERS.

By Ernest Schaeffle.

Do we not sometimes overlook the fact that America has a "standing army" of over 5,000,000 hunters, trained in the use of firearms, accustomed to the most strenuous exercise, and recruited from the most active, courageous part of the population?

And singularly enough this splendid "army" costs the government not a cent in appropriation nor a moment's anxiety or directorship, but pays its own bills and administers its own affairs. Furthermore, the "army" about which we are speaking takes no man from useful industry during times of peace, but rather increases the productive capacity of its members and in many ways makes of them healthier, happier and more useful members of society. Of what other "army" can this much be said?

We are inspired to write of this "army" at this particular moment, knowing that the thoughts of most Americans are clustered around the central ideas of war, armies and the safety of the nation. At a time like this many of us are likely to regret the fact that our regular army is so small and to rather condemn our peace time determination to get along with less than a hundred thousand soldiers. We are also likely to give attention to the militarist with his "I told you so" impudence and suggestion of an European system.

Just at this point it is well for us to take a long breath and collect our scattered wits, for have we not as a nation always met every emergency that called for an intelligent, courageous army of men who could and would shoot? And after reviewing certain conditions in our national life how can we doubt our ability to meet future emergencies as they may arise? The American people have always been a nation of hunters. We have lived in a land blessed by nature with an abundance of game and have always had the privilege of hunting such game in a degree enjoyed by few other peoples in modern times. Given the supply and the opportunity, quite naturally the game has been hunted, universally and hard, for man is still a hunter and full of the desire to kill. In the country's infancy game was taken for food, while in later years it has been regarded more and more as the object and reward of sport; but always it has been hunted, from one ocean to the other and by millions of our heartiest, most "American" men.

With the wonderful advance that has been made in our country in the mechanical trades and businesses has come wonderful improvement and cheapening in firearms and ammunition, so that today the "poor man" with an outlay of $25 is the practical equal in the field of his English brother with an outfit running into the hundreds of dollars.

Which all brings us back to our theme:

The country has now (and has had since its beginning), an "army" of hunters, confined to the game fields in times of peace, but ready for defense of the nation in time of peril. This "army" would never have existed and would not exist now had we not recognized the injustice of conditions in older countries and guarded our inherent right to bear arms and to hunt. But where would our army be if the land had no game, and where will it be in future if the game we have saved is to be exterminated, as seems to be the real purpose of even many who call themselves "game protectors" and what not?

The best guarantee of American freedom from foreign invasion and more dangerous aggression and demoralization at home would seem to be a rifle in every household, with the young men trained in its use by experience in the hunting field after game.

CALIFORNIA FISH AND GAME COMMISSION ADMINISTRATIVE DISTRICTS.

San Francisco District.

Office: 734 Mills Building, San Francisco, California.

Alameda County.
Contra Costa County.
Del Norte County.
Humboldt County.
Lake County.
Marin County.
Mendocino County.
Monterey County.
San Benito County.
San Francisco County.
San Mateo County.
Santa Clara County.
Santa Cruz County.
Sonoma County.

Area, 20,650 square miles; population, 1910, 1,002,405.

Sacramento District.

Office: Forum Building, Sacramento, California.

Alpine County.
Amador County.
Butte County.
Calaveras County.
Colusa County.
El Dorado County.
Glenn County.
Lassen County.
Modoc County.
Napa County*
Nevada County.
Placer County.
Plumas County.
Sacramento County.
San Joaquin County.
Shasta County.
Sierra County.
Siskiyou County.
Solano County*
Sutter County.
Tehama County.
Trinity County.
Yuba County.
Yolo County.

Area, 45,903 square miles; population, 1910, 370,420.

*On August 1, 1914, Napa and Solano counties will be transferred to the San Francisco District.

Los Angeles District.

Office: 510 Consolidated Realty Building, Los Angeles, California.

Imperial County.
Inyo County.
Los Angeles County.
Mono County.
Orange County.
Riverside County.
San Bernardino County.
San Diego County.
San Luis Obispo County.
Santa Barbara County.
Ventura County.

Area, 61,186 square miles; population, 1910, 779,709.

Fresno District.

Office: Forsyth Building, Fresno, California.

Fresno County.
Kern County.
Kings County.
Madera County.
Mariposa County.
Merced County.
Stanislaus County.
Tuolumne County.
Tulare County.

Area, 29,331 square miles; population, 1910, 225,115.

BOARD OF FISH AND GAME COMMISSIONERS.

Roster June 30, 1914.

Commissioners appointed by the Governor, by and with the consent of the Senate.
Term at pleasure of the Governor. No compensation.

F. M. Newbert, *President*, Sacramento	Appointed August 3, 1911
M. J. Connell, Los Angeles	Appointed February 1, 1909
Carl Westerfeld, San Francisco	Appointed November 28, 1911
Ernest Schaeffle, *Executive Secretary*	Appointed November 29, 1911

Head office, San Francisco, 734 Mills Building.

Under direction of Commissioner Carl Westerfeld.

Ernest Schaeffle	Executive Secretary	Daniel O'Connell	Clerk
J. S. Hunter	Assistant Secretary	H. R. Dunbar	Clerk
R. D. Duke	Attorney	Mae D. Horn	Stenographer
O. H. Reichling	Cashier	Lillian Ciegler	Stenographer
Leo N. Pettit	Record Clerk		

Sacramento office, Forum Building.

Under direction of Commissioner F. M. Newbert.

George Neale	Assistant	Geo. T. Hanley	Clerk and stenographer
Leslie Rust	Office Boy		

Los Angeles office, 510 Consolidated Realty Building.

Under direction of Commissioner M. J. Connell.

H. I. Pritchard	Assistant	E. A. McKee	Clerk and stenographer

Fresno office, 347 Forsyth Building.

Under direction of Deputy A. D. Ferguson.

Lida H. Ransom	Clerk and stenographer

LIST OF REGULAR DEPUTIES.

San Francisco District.

Alameda County.

J. L. Bundock	Oakland
Earl Downing	Pleasanton

Del Norte County.

Paul Smith	Requa

Humboldt County.

Earl P. Barnes	Eureka
Theo. M. Benson	Fortuna

Mendocino County.

Chas. R. Perkins	Fort Bragg
B. H. Miller	Ukiah

Marin County.

Vernon D. Thomas	San Rafael

Monterey County.

Phil H. Oyer	Pacific Grove
Frank Shook	Salinas

Santa Cruz County.

J. H. Hill	Watsonville
R. B. Heacock	Seabright

Santa Clara County.

I. L. Koppel	San Jose

San Francisco County.

M. S. Clark	San Francisco
A. M. Fairfield	San Francisco
H. E. Foster	San Francisco
M. L. Cross	San Francisco
C. E. McPherson	San Francisco
Edward Boyle	San Francisco
A. M. Cunningham	San Francisco

Sonoma County.

A. F. Lea	Cloverdale
Henry Lencioni	Healdsburg

Launch "Quinnat."

H. B. Nidever, Captain

J. Christensen, Engineer	Headquarters, Vallejo

Sacramento District.

Amador County.

Frank S. Parke	Sutter Creek

Calaveras County.

David E. Roberts	Murphys

Colusa County.

S. J. Carpenter (on furlough)	Maxwell

El Dorado County.

Euell Gray	Shingle

Lassen County.

Frank P. Cady	Susanville

Modoc County.

Geo. W. Courtright	Straw

Nevada County.

R. C. O'Connor	Grass Valley
S. J. Mandeville	Truckee

Napa County.

W. J. Moore	Napa

Placer County.

Chester A. Scroggs	Loomis

Sacramento County.

W. J. Green	Sacramento
C. H. Blemer	Sacramento

Shasta County.

J. S. White	Redding

Siskiyou County.

J. W. Harris	Greenview

Solano County.

Wm. H. Armstrong	Vallejo

Sutter County.

E. D. Ricketts	Live Oak

San Joaquin County.

Richard Squire	Lodi
Geo. J. Merritt	Manteca

Trinity County.

G. O. Laws	Weaverville

Tehama County.

T. W. Birmingham	Red Bluff

Yolo County.

R. L. Sinkey	Woodland

Los Angeles District.

Inyo County.

E. H. Ober	Big Pine

Mono County.

A. J. Stout	Mono Lake

Orange County.

W. K. Robinson	El Toro

Riverside County.

James H. Gyger	Elsinore

Los Angeles County.

I. A. Bordner	Long Beach

Santa Barbara County

H. J. Abels	Santa Maria

San Bernardino County.

James A. Vale	San Bernardino

San Diego County.

Webb Toms	San Diego
A. T. Norton (crawfish inspector)	San Diego

San Luis Obispo County.

C. E. Cook	San Luis Obispo

Ventura County.

John J. Barnett	Ventura

Fresno District.

Fresno County.

D. H. Hoen	Fresno
S. L. N. Ellis	Fresno
F. A. Bullard	Dunlap

Kern County.

Tipton Mathews	Wasco

Kings County.

E. W. Smalley	Hanford

Merced County.

M. A. Wright	Merced

Stanislaus County.

J. E. Newsome	Newman

Tuolumne County.

Geo. F. Grant	Columbia

* * *

Hayward Game Farm.

W. N. Dirks	Superintendent
R. Gansberger	Laborer

* * *

Hatcheries—screen and ladder investigation.

W. H. Shebley, Superintendent of hatcheries	Sisson
J. H. Hoerl, Fish cultural clerk	Sisson
A. E. Doney, Screen and ladder surveyor and spawn taker	Sisson
A. E. Culver, Screen surveyor	Sisson
Chas. L. Gilmore, Engineer-Draftsman	Sacramento
Jack Forrest, Apprentice draftsman	Sacramento
R. W. Requa, Second class fish culturist	Chico

Sisson hatchery and spawning stations.

F. McCrea	First class messenger, distribution car, and fourth class fish culturist
C. Nixon	Third class fish culturist
F. Sullaway	Fourth class fish culturist
W. L. Gatchell	Fourth class fish culturist
E. Clessens	Fourth class fish culturist
Geo. McCloud, Sr.	Fourth class fish culturist
J. Shebley	Fourth class fish culturist
Norman Sisson	Fourth class fish culturist
R. I. Bassler	Messenger, distribution car, and fourth class fish culturist
L. Phillips	Messenger distribution car and fourth class fish culturist
J. B. Sollner	Fourth class fish culturist
J. E. Winchcomb	Pond fish feeder
F. Clessens	Carpenter
Wm. Heffernan	Watchman
R. Rupp	Pond Watchman
A. E. Glidden	Temporary laborer
B. J. Benning	Temporary laborer
Geo. McCloud, Jr.	Temporary laborer
G. L. Morrison	Laborer
A. Hill	Temporary laborer

Tahoe Hatcheries.

E. W. Hunt	Second class fish culturist
F. F. Anderson	Third class fish culturist (temporary)
Geo. E. West	Fourth class fish culturist
A. Steininger	Temporary laborer
Wm. Storrs	Temporary laborer

Price Creek Hatchery.

W. O. Fassett (leave of absence)	Second class fish culturist

Ukiah Hatchery.

A. V. La Motte	Second class fish culturist
W. R. Crockett	Temporary fish culturist

Unattached.

F. A. Shebley (leave of absence)	Second class fish culturist

INVENTORY OF STATE PROPERTY IN CHARGE OF FISH AND GAME COMMISSION.

Recapitulation Statement, June 30, 1914.

Office equipment	$4,901 46
Sundry property in charge of employees	2,337 59
Game farm, cottage, equipment, birds, etc.	7,151 59
Patrol launches	7,658 48
Hatcheries at Sisson, Tahoe, Tallac, Glen Alpine, Price Creek, Wawona, Ukiah and spawning stations, including fish distribution car, buildings, water rights, equipment, etc.	59,535 24
Total	$81,608 97

FINANCIAL STATEMENT, YEARS 1912-1913 AND 1913-1914.

Showing Revenues for this Period.

Balance in state treasury, June 30, 1912		$32,668 56
Receipts.		
Sale of hunting licenses—1911-1912	$5,525 48	
Sale of hunting licenses—1912-1913	166,130 93	
Sale of hunting licenses—1913-1914	158,063 65	
		329,720 06
Sale of market fishing licenses—1912-1913	$23,857 50	
Sale of market fishing licenses—1913-1914	26,985 00	
		50,842 50
Sale of wholesale fish and game dealers' licenses—1911-1912	$125 00	
Sale of wholesale fish and game dealers' licenses—1912-1913	1,360 00	
Sale of wholesale fish and game dealers' licenses—1913-1914	1,280 00	
		2,765 00
Sale of trout farm licenses—1912-1913	$35 00	
Sale of trout farm licenses—1913-1914	20 00	
		55 00
Sale of anglers' licenses—1914		13,229 25
Sale of game farm products—1912-1913	$532 00	
Sale of game farm products—1913-1914	734 40	
		1,266 40
Sales of sundry articles, rebates on scrip books, etc.		122 10
Received from importers of crawfish for inspecting same in closed season—1912-1913	$793 33	
Received from importers of crawfish for inspecting same in closed season—1913-1914	900 00	
		1,693 33
Fines paid into state treasury for violations of fish, game, and license laws—1912-1913	$17,938 27	
Fines paid into state treasury for violations of fish, game, and license laws—1913-1914	14,934 32	
		32,872 59
Total		$465,234 79

DISBURSEMENTS, YEAR 1912-1913.

San Francisco District—salaries, traveling expenses, rentals, supplies, etc.	$48,799 70
Sacramento District—salaries, traveling expenses, rentals, supplies, etc.	43,861 25
Los Angeles District—salaries, traveling expenses, rentals, supplies, etc.	17,384 32
Fresno District—salaries, traveling expenses, rentals, supplies, etc.	21,084 50
Game Farm—salaries, traveling expenses, rentals, supplies, etc.	5,827 93
Patrol launches—salaries, expenses, supplies, etc.	4,574 20
Prosecutions and allowances	9,774 68
Commissions—hunting and market fishing licenses	15,050 65
Lion bounties	5,280 00
Commissioners' traveling expenses	247 75
Scientific investigations and publicity—salaries, expenses, supplies, etc.	8,305 67
Sundry bills	7,293 47
Screen and ladder surveys—salaries, expenses, supplies, etc.	4,841 66
Superintendent of hatcheries and assistants—salaries, expenses, supplies, etc.	2,636 10
Sisson hatchery—salaries, expenses, supplies, etc.	15,130 18
Tahoe and Tallac hatcheries—salaries, expenses, supplies, etc.	2,986 08
Price Creek hatchery—salaries, expenses, supplies, etc.	2,052 49
Ukiah hatchery—salaries, expenses, supplies, etc.	843 90
Wawona hatchery—salaries, expenses, supplies, etc.	154 05
Bogus Creek station—salaries, expenses, supplies, etc.	950 74
Brookdale hatchery and Swanton spawning station—salaries, expenses, supplies, etc.	4,094 81
Sacramento experimental station—salaries, expenses, supplies, etc.	977 14
Fish distribution car—salaries, expenses, supplies, etc.	3,387 05
	$225,038 27

DISBURSEMENTS, 1913-1914.

General Fish and Game Patrol, Administration, etc.

San Francisco Division.

Salaries of deputies and employees	$37,404 50	
Traveling expenses, rentals, office supplies, etc.	17,096 84	
		$54,501 34

Sacramento Division.

Salaries of deputies and employees	$25,834 00	
Traveling expenses, rentals, office supplies, etc.	13,050 14	
		38,884 14

Los Angeles Division.

Salaries of deputies and employees	$12,227 00	
Traveling expenses, rentals, office supplies, etc.	4,953 98	
		17,180 98

Fresno Division.

Salaries of deputies and employees	$11,746 00	
Traveling expenses, rentals, office supplies, etc.	6,894 85	
		18,640 85

Miscellaneous Expenditures.

Traveling expenses, commissioners	880 02
Prosecutions and allowances	8,486 68
General printing, license lithographing, etc.	6,458 28
Sub-total, fish and game patrol, administration	$145,032 29

Sub-total fish expenditures, 40 per cent, $58,012.92.
Sub-total game expenditures, 60 per cent, $87,019.37.

Fishery Expenditures.

Superintendent of hatcheries and assistants.

Salaries	$4,072 50	
Traveling expenses, supplies, etc.	1,009 81	
		$5,082 31

Sisson hatchery.

Salaries	$13,476 23	
Traveling expenses, supplies, etc.	7,881 64	
		21,357 87

Tahoe and Tallac hatcheries.

Salaries	$2,650 17	
Traveling expenses, supplies, etc.	679 73	
		3,329 90

Price Creek hatchery.

Salaries	$1,791 67	
Traveling expenses, supplies, etc.	1,016 53	
		2,808 20

Ukiah hatchery and Snow Mountain.

Salaries	$904 25	
Traveling expenses, supplies, etc.	419 90	
		1,324 15

Wawona hatchery.

Salaries	$487 50	
Traveling expenses, supplies, repairs, etc.	247 70	
		735 20

Klamath spawning stations.

Salaries	$2,094 50	
Traveling expenses, supplies, repairs, etc.	1,322 76	
		3,417 26

Brookdale hatchery.

Salaries	$320 00	
Traveling expenses, supplies, repairs, etc.	77 55	
		397 55

Sacramento experimental station.

Rental		12 00

Screen and fishway surveys and supervision.

Salaries	$6,607 33	
Traveling expenses, supplies, etc.	2,632 30	
		9,239 63

Fish patrol (launches, etc.).

Salaries	$2,649 00	
Traveling expenses, supplies, repairs, etc.	1,768 91	
		4,417 91

Fish distribution (car and messenger).

Salaries	$1,751 02	
Traveling expenses, supplies, repairs, etc.	1,907 87	
		3,658 89

Fish transplanting (pack train, messenger, etc.).

Traveling expenses, supplies		167 51

Miscellaneous expenditures.

Anglers' license commissions		1,148 30
Market fishing license commissions		582 75
Crawfish inspection		1,100 00
Sub-total fish expenditures		$58,729 43

Game Expenditures.

Hayward game farm.

Salaries	$2,698 50	
Traveling expenses, repairs, supplies, etc.	3,978 86	
		$6,677 36

Miscellaneous expenditures.

Hunting license commissions and refunds		14,680 70
Mountain lion bounties		4,100 00
Sub-total game expenditures		$25,458 06

Fish and game research and publicity.

Salaries		$600 00	
Traveling expenses, supplies, etc.		491 04	
			$1,091 04
Sub-total fish expenditures, 40 per cent	$436 42		
Sub-total game expenditures, 60 per cent	654 62		

Recapitulation, 1913-1914.

Total fish expenditures	$117,178 76
Total game expenditures	113,132 06
Grand total, all expenditures	$230,310 82

SUMMARY OF PROSECUTIONS FOR VIOLATIONS OF STATE GAME LAWS.

July 1, 1912, to June 30, 1914.

Offense	Number of arrests	Convicted	Acquitted and dismissed	Sentence suspended and probation	Pending	Number of days imprisonment	Fines imposed	Fines collected
Violations hunting license law	526	489	36	20	1	280	$8,386 50	$7,658 50
Deer—killing, pursuing, possession, close season; excess bag limit	166	134	30	4	2	779	4,957 50	3,548 50
Female deer and fawns—killing and possession	64	54	10	2		182	2,640 00	2,293 00
Deer hides—female; evidence of sex removed; buying or selling (hides and meat)	18	10	7		1	100	675 00	375 00
Ducks—killing and possession, close season	28	25	3			25	790 00	765 00
Ducks—excess bag limit	67	43	23	4	1		1,340 00	1,315 00
Ducks—Using a trained animal for taking; night shooting; shooting from power boat in motion	54	40	12	2	2		725 00	650 00
Quail—killing, possession, close season	82	80	2	6		62	1,895 00	1,733 00
Quail—excess bag limit; buying or selling	8	8					425 00	425 00
Doves—killing, possession, close season; excess bag limit	33	32	1			55	680 00	570 00
Snipe, curlew, rail, plover and other shore birds—killing, possession, close season; excess bag limit	13	12	1	1		50	305 00	255 00
Pheasants, swans—killing, etc	2	2					75 00	75 00
Non-game birds—killing, possession, shipping	122	113	9	8			1,394 50	1,214 50
Tree squirrels—killing, possession, close season	18	9	9	2			230 00	180 00
Cottontail and bush rabbits, killing, possession, close season; excess bag limit	77	72	5	16			1,355 00	1,045 00
Elk—possession of meat	1	1					50 00	50 00
Illegal trapping of birds and possession without permit	2	2					50 00	50 00
Totals	1,281	1,126	148	65	7	1,533	$25,973 50	$22,202 50

SUMMARY OF PROSECUTIONS FOR VIOLATIONS OF STATE FISH LAWS.

July 1, 1912, to June 30, 1914.

Offense	Number of arrests	Convicted	Acquitted and dismissed	Sentence suspended and probation	Pending	Number of days imprisonment	Fines imposed	Fines collected
Fishing (market) without a license	123	102	18	14	3	88	$1,559 00	$816 00
Fishing (angling) without a license	15	14	1	1	----------	2	535 00	470 00
Wholesale dealing in fish without a license; not keeping a register of fish purchased	8	3	4	----------	1	----------	85 00	85 00
Illegal fishing apparatus (nets and lines)	96	66	23	11	7	391	2,530 00	1,648 00
Salmon—catching, possession, close season	17	5	9	2	3	2	360 00	348 00
Saturday and Sunday fishing, salmon, shad and striped bass	6	4	2	1	----------	150	60 00	60 00
Striped bass—close season; underweight; exporting	46	33	13	6	----------	----------	520 00	455 00
Black bass—close season; excess bag limit; catching by means other than hook and line	17	15	2	2	----------	65	275 00	215 00
Trout—close season; excess bag limit; catching by means other than hook and line; buying or selling under weight	56	46	10	8	----------	----------	1,020 00	1,020 00
Steelhead trout—close season; spearing	37	31	6	4	----------	195	995 00	575 00
Catfish—undersize, buying or selling	25	21	4	1	----------	10	545 00	545 00
Taking fish within 50 feet of a fishway	4	4	----------	----------	----------	----------	250 00	250 00
Using explosives to take fish	15	7	8	2	----------	250	1,500 00	125 00
Polluting waters—(oil, sawdust, etc.)	13	3	6	----------	4	----------	550 00	250 00
Shipping fish not properly marked	1	1	----------	----------	----------	----------	20 00	20 00
Taking fish—reservations	20	25	4	----------	----------	----------	850 00	680 00
Young of fish—taking or possession	11	9	2	----------	----------	----------	160 00	140 00
Salt water perch—shipping for sale	1	1	----------	----------	----------	----------	10 00	10 00
Taking surf fish other than with hook and line	2	2	----------	----------	----------	----------	20 00	----------
Trawling in District No. 6	13	----------	----------	----------	13	----------	----------	----------
Crabs—close season; undersize; female	98	66	32	21	----------	----------	790 00	760 00
Abalones—close season; undersize; other than for food purposes	29	25	4	2	----------	26	580 00	399 00
Crawfish, lobsters—undersize and oversize	18	16	2	----------	----------	----------	365 00	325 00
Clams—excess bag limit; undersize	32	28	4	1	----------	10	358 00	125 00
Totals	712	527	154	76	31	1,189	$13,837 00	$9,271 00

RECAPITULATION.

Arrests:			
Fish cases		712	
Game cases		1,281	
Total			1,993
Convictions:			
Fish cases	527		
Game cases	1,126		
		1,653	
Acquittals and dismissals:			
Fish cases	154		
Game cases	148		
		302	
Pending cases:			
Fish cases	31		
Game cases	7		
		38	
Total			1,993
Fines imposed:			
Fish cases			$13,837 00
Game cases			25,973 50
Total			$39,810 50
Fines collected:			
Fish cases			$9,271 00
Game cases			22,202 50
Total			$31,473 50
Number of days imprisonment imposed:			
Fish cases			1,189
Game cases			1,533
Total			2,722

Total Arrests for a Period of Twelve Years.

1902-1904	550
1904-1906	774
1906-1908	1,192
1908-1910	1,771
1910-1912	2,063
1912-1914	1,993
Total	8,343

SEIZURES OF FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

July 1, 1912, to June 30, 1914.

Illegally used fishing apparatus (nets and lines)	*223	
Salmon	11,410	pounds
Striped bass	7,886	pounds
Steelhead	781	pounds
Black bass	90	pounds
Catfish	1,842	pounds
Trout	241	pounds
Crabs	5,775	
Abalones	304	
Crawfish	898	
Clams	1,976	
Miscellaneous fish	1,153	pounds
Crawfish traps	64	
Ducks	6,656	
Quail	278	
Shore birds	86	
Doves	96	
Non-game birds	892	
Deer meat	2,190	pounds
Hides	60	
Rabbits (cottontail and bush)	1,318	
Squirrels	11	
Golden eagle (mounted)	2	

Illegally used fishing apparatus, after condemnation in superior courts, is destroyed by the board; all wholesome fish and game is donated to public and charitable institutions, from whom many grateful letters of acknowledgment have been received.

During the period from July 1, 1912, to June 30, 1914, there were 1,191 searches and inspections of markets, restaurants, private individuals, conveyances, etc., for illegal fish and game, made by deputies. Of this number, 975 were made in San Francisco.

*The 223 nets and lines seized represent 12,305 fathoms, or 73,834 feet.

HUNTING LICENSE SALES.

July 1, 1907, to June 30, 1914.

Counties	1907-1908	1908-1909	1909-1910	1910-1911	1911-1912	1912-1913	1913-1914
Alameda	$5,766	$4,359	$5,724	$7,071	$7,278	$8,218	$8,727
Alpine	60	60	36	70	109	94	64
Amador	1,079	880	945	1,002	950	1,263	1,404
Butte	2,375	2,414	2,419	2,731	2,878	3,035	3,097
Calaveras	972	736	734	829	1,116	1,430	1,505
Colusa	1,364	1,208	1,270	1,747	1,688	1,690	1,619
Contra Costa	1,660	1,288	1,296	1,474	1,660	1,980	2,226
Del Norte	322	369	312	322	292	262	200
El Dorado	1,087	947	864	955	1,026	1,298	1,337
Fresno	3,718	3,657	4,194	5,512	5,956	6,358	5,882
Glenn	698	672	796	1,027	1,102	1,197	1,235
Humboldt	2,843	2,595	3,056	3,652	3,451	3,555	3,280
Imperial	559	509	445	405	366	420	582
Inyo	916	916	1,055	1,010	950	1,011	1,228
Kern	2,095	2,521	3,550	4,734	5,039	5,301	4,600
Kings	1,010	950	1,238	1,352	1,246	1,564	1,278
Lake	1,217	929	1,028	1,194	1,243	1,143	1,108
Lassen	524	441	518	551	638	843	1,159
Los Angeles	12,545	12,225	13,109	15,298	13,136	19,216	20,547
Madera	745	619	793	727	799	971	939
Marin	939	905	763	981	608	896	292
Mariposa	395	360	325	300	341	429	393
Mendocino	----------	832	1,336	1,815	2,495	2,344	2,261
Merced	1,375	1,491	1,530	1,789	1,928	2,136	1,872
Modoc	450	413	406	506	599	870	815
Mono	194	181	235	257	292	224	247
Monterey	1,937	1,968	2,239	2,287	2,081	2,193	2,002
Napa	1,412	1,423	2,025	1,990	2,006	2,166	2,140
Nevada	1,260	1,524	1,601	1,624	1,665	1,603	1,681
Orange	1,946	1,822	2,200	2,351	2,363	2,834	2,715
Placer	1,583	1,534	1,786	1,879	2,000	1,831	2,306
Plumas	645	618	458	545	518	706	789
Riverside	2,477	2,448	3,347	3,271	2,956	3,429	2,899
Sacramento	3,851	3,515	3,588	4,035	4,737	4,743	5,164
San Benito	737	798	1,060	1,006	1,120	1,201	1,049
San Bernardino	3,314	3,071	3,619	3,675	3,498	4,287	3,848
San Diego	3,020	2,929	3,454	3,513	3,651	5,263	5,637
San Francisco	2,120	1,252	1,015	885	*	*	*
San Joaquin	2,785	3,050	3,245	3,402	3,629	4,470	4,481
San Luis Obispo	1,533	1,553	1,341	1,504	1,393	1,450	1,338
San Mateo	1,513	1,299	1,524	1,765	1,698	1,773	1,749
Santa Barbara	1,873	1,796	1,803	1,759	1,900	2,087	2,073
Santa Clara	3,855	3,193	3,612	4,212	4,595	5,400	4,809
Santa Cruz	2,045	2,027	2,030	1,959	2,345	2,607	2,564
Shasta	2,120	2,083	2,163	2,260	1,945	1,997	2,092
Sierra	321	239	164	148	167	199	324
Siskiyou	2,881	2,748	2,843	3,271	3,373	3,643	3,503
Solano	2,042	1,948	1,597	2,092	2,475	2,521	2,287
Sonoma	4,030	4,027	4,390	4,959	5,730	6,178	6,150
Stanislaus	1,162	1,182	1,415	1,699	1,556	1,631	1,630
Sutter	588	540	631	905	898	928	879
Tehama	1,180	1,161	1,135	1,342	1,243	1,420	1,500
Trinity	522	506	616	793	693	889	927
Tulare	2,525	2,703	2,998	2,770	3,075	3,679	3,207
Tuolumne	1,092	1,052	1,036	1,062	1,094	1,145	1,287
Ventura	1,564	1,462	1,862	1,949	1,857	2,054	2,152
Yolo	1,454	1,408	1,500	1,699	1,956	2,392	2,199
Yuba	901	832	960	1,277	1,194	1,365	1,389
†Fish and Game Commission	13,231	14,767	17,221	14,838	14,233	16,910	16,488
‡Fish and Game Commission	----------	----------	----------	62	374	979	1,116
§Fish and Game Commission	----------	----------	----------	3,166	4,982	2,014	1,224
#Fish and Game Commission	----------	----------	----------	----------	----------	199	526
Totals	$118,427	$114,950	$128,450	$143,265	$146,181	$165,984	$164,111

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*San Francisco county clerk sold no hunting licenses during years indicated.
†San Francisco office. ‡Fresno office. §Los Angeles office. #Sacramento office.

STATEMENT OF LION BOUNTIES PAID BY FISH AND GAME COMMISSION FROM OCTOBER, 1907, TO JUNE 30, 1914.

Counties	1907	1908	1909	1910	1911	1912	1913	Jan. 1 to June 30, 1914	Total
Alameda		1							1
Amador		3		1	2	2			8
Butte	2	11	5	2	4	3	2	1	30
Calaveras		1	4	1		1		1	8
Colusa		8		3	3	1	1	2	18
Del Norte		10	12	4	11	11	23	4	75
El Dorado	2	7	2	1	8	9	6		35
Fresno		1	3	1		4		1	10
Glenn		13	6	6	1	4	5	1	36
Humboldt	10	113	67	71	42	50	41	24	418
Inyo						1			1
Kern		8	10	12	5	9	10	2	56
Lake	2	14	11	13	9	10	7	2	68
Lassen			1		2	1	2		6
Los Angeles		7	1	2	2		2	1	15
Madera		3	5	1		1	1	9	20
Mariposa	2	4	3	6	2	1	4	7	29
Mendocino	5	44	18	11	16	17	24	11	146
Merced				1					1
Modoc			1	1	1				3
Monterey		14	11	7	1	3	9	3	48
Mono								2	2
Napa				1		2			3
Nevada		1	1	1					3
Orange			1	1	1		1		4
Placer		5	4	1	2	7	3	1	23
Plumas		2		3		1	2		8
Riverside		2	5			4	2		13
San Benito		1	2	1	2	11	3	2	22
San Bernardino		5	2	1	2		2	1	13
San Diego		3	5	5	8	3	1	1	26
San Luis Obispo		11	5	9	4	4	5	4	42
San Mateo				1					1
Santa Barbara		7	24	7	3	5	11	1	58
Santa Clara			4			1	1	1	7
Santa Cruz				1					1
Shasta	1	25	32	31	29	28	22	5	173
Sierra		1				3	2		6
Siskiyou	1	31	35	45	25	25	22	13	197
Sonoma			2	4	1	4	1	1	13
Stanislaus			2		1				3
Sutter						1			1
Tehama	3	31	19	25	10	22	27	2	139
Trinity	9	86	34	32	22	15	14	10	222
Tulare		6	8	11	4	5	3	3	40
Tuolumne		6	10	5	2	4	1	1	29
Ventura		1	6	4	6	2		1	20
Yuba		1			2				3
Totals	37	482	361	333	233	275	260	118	2,099

Total bounty paid, at $20 per scalp, $41,980.

NUMBER OF DEER KILLED IN THE VARIOUS COUNTIES DURING THE OPEN SEASONS OF 1911, 1912, 1913.

District No. 1.

County	1911	1912	1913
Del Norte	No record	42	See Dist. 2
Siskiyou	275	300	313
Modoc	54	129	129 Est.
Lassen	39	50	38
Shasta	506	281	396
Trinity	707	367	522
Humboldt	711	256	See Dist. 2
Tehama	5	159	165
Totals	2,297	1,584	1,563

District No. 2.

Mendocino	422	546	345
Glenn	42	No record	396
Colusa	136	144	8
Lake	45	494	161
Sonoma	664	261	193
Napa	29	31	72
Yolo	No record	51	No record
Solano	23	12	14
Marin	355	363	325
Del Norte	No record	See Dist. 1	120
Humboldt	See Dist. 1	See Dist. 1	700
Totals	1,716	1,902	2,334

District No. 3.

Plumas	28	10	23
Butte	2	9	No record
Sierra	6	No record	No record
Yuba	7	No record	No record
Sutter	No record	No record	No record
Nevada	88	117	38
Placer	71	40	46
El Dorado	202	240	248
Sacramento	35	78	6
Amador	3	11	17
Alpine	No record	No record	See Dist. 7
Calaveras	47	130	204
Tuolumne	183	250	226
Mariposa	14	No record	50 Est.
Mono	9	7	See Dist. 7
San Joaquin	No record	See Dist. 4	30
Totals	695	892	888

District No. 4.

San Joaquin	No record	30	See Dist. 3
Stanislaus	No record	60	35
Merced	No record	34	34 Est.
Madera	43	69	69 Est.
Fresno	182	124	30
Kings	No record	No record	No record
Tulare	276	266	266 Est.
Kern	112	156	350
Totals	613	739	784

Number of Deer Killed During 1911, 1912 and 1913—Continued.

District No. 5.

County	1911	1912	1913
Contra Costa	4	20	20 Est.
Alameda	52	270	420
San Francisco	No hunting	No hunting	No hunting
San Mateo	132	155	202
Santa Clara	19	350	543
Santa Cruz	69	109	85
San Benito	123	67	42
Monterey	404	510	552
San Luis Obispo	25	132	132 Est.
Santa Barbara	See Dist. 6	See Dist. 6	210
Totals	828	1,613	2,206

District No. 6.

County	1911	1912	1913
Santa Barbara	114	214	See Dist. 5
Ventura	10	125	110
Los Angeles	17	186	89
Orange	27	38	16
San Diego	61	62	62
Imperial	No record	No record	No record
Riverside	1	89	76
San Bernardino	22	42	40
Inyo	88	45	See Dist. 7
Totals	340	801	393

District No. 7.

County	1911	1912	1913
Mono	See Dist. 8	See Dist. 8	7 Est.
Alpine	No record	No record	14
Inyo	See Dist. 6	See Dist. 6	80
Total	----------	----------	101

Total for year 1911	6,489
Total for year 1912	7,537
Total for year 1913	8,259

STATE OF CALIFORNIA

FISH AND GAME COMMISSION

TWENTY-FOURTH BIENNIAL REPORT

For the Years 1914-1916

CALIFORNIA
STATE PRINTING OFFICE
1916

26231

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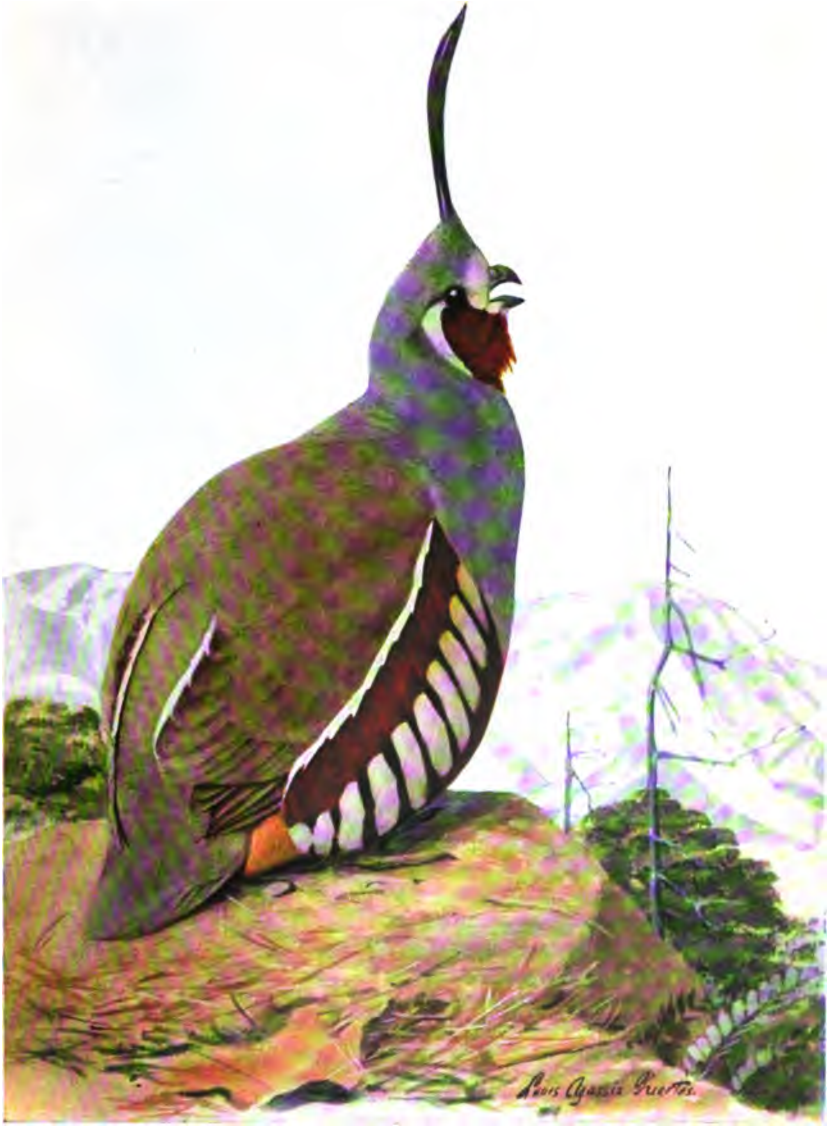


—*From painting by Louis Agassiz Fuertes*

MOUNTAIN QUAIL ***(Oreortyx picta)***

LETTER OF TRANSMITTAL.

San Francisco, California,
June 30, 1916.

To His Excellency Hiram W. Johnson,
Governor of the State of California.

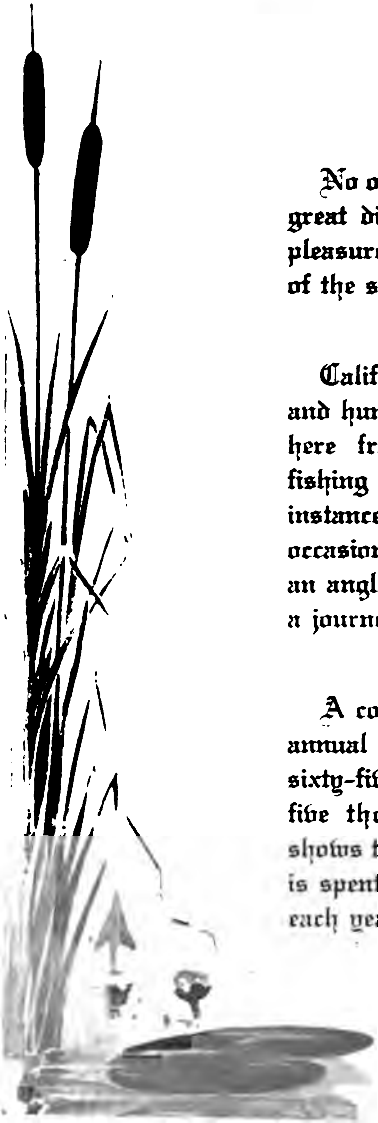
Sir: In accordance with law, we submit for your consideration the twenty-fourth biennial report of the Fish and Game Commission, the same being a record of the work, receipts and expenditures for the biennial period July 1, 1914, to June 30, 1916. A summary of the work accomplished occupies the first pages, followed by the detailed reports of the department heads and district offices. The appendix contains the statistical reports. Heretofore the biennial report has been the only printed record of the commission. Current activities now are recorded in the quarterly, California Fish and Game, published under our auspices. Further detailed accounts of the work of this board can be obtained, therefore, by referring to volumes 1 and 2 of this periodical.

Respectfully submitted.

Carl Westerfeld

Board of Fish and Game Commissioners.

By Ernest Schaeffle,
Executive Officer.



No other natural resource brings such great dividends in money, food, health, pleasure and happiness as does the asset of the state's fish and game resources.

◆

California is a sportsman's paradise and hunters and fishermen are attracted here from all over the world. The fishing near Santa Catalina Island, for instance, has been on several different occasions of sufficient interest to bring an angler from South Africa, entailing a journey of thirteen thousand miles.

◆

A computation based on the average annual expenditure of the one hundred sixty-five thousand hunters and eighty-five thousand anglers in California shows that at least twenty million dollars is spent in the pursuit of fish and game each year.

1914 TWENTY-FOURTH 1916 BIENNIAL REPORT

INTRODUCTION.

The past biennial period has been one of marked advance in the protection and preservation of wild life, the propagation of fish, the stocking of streams, the construction of fish ladders and screens, and above all in the accumulation of important data on fish and game and in the development of a public sentiment favoring wild life conservation. All of the duties of the commission as prescribed by law and above outlined have been performed as fully and faithfully as the financial and other resources have allowed.

The accomplishments here reported have been made possible through funds obtained by the sale of hunting licenses, commercial fishermen's licenses and anglers' licenses, and from fines received from violators. No appropriations have been made by the legislature. Although the larger burden of support rightly falls on the men who hunt and fish, yet, either no revenue, or revenue not in proportion to the benefit received, is derived from others having an interest in game resources. For instance, the fisherman who secures but a few fish each day which he sends to market, pays a larger license fee than the salmon cannery, which profits enormously by the fact that the fish supply is maintained. The market hunter who commercializes game pays the same license as the man who hunts but once a year. The trapper of fur-bearing mammals pays nothing towards the support of investigations needed to assure the conservation of the resources from which he draws profit. Could the license fees be made proportionate to the benefits secured, funds would be available for the further development of the game and fishery resources by the commission.

Many eastern fish and game commissions have the cooperation of numerous sportsmen's organizations, who hire attorneys and otherwise help in conserving game. There are few active organizations of this kind in California and the enforcement of the fish and game laws and efforts to conserve fish and game rest almost wholly with the commission. The problem is made still more complicated because of the lack of cooperation shown by the peace officers of the state and because

THE MEN WHO ADMINISTER CALIFORNIA'S WILD LIFE RESOURCES.

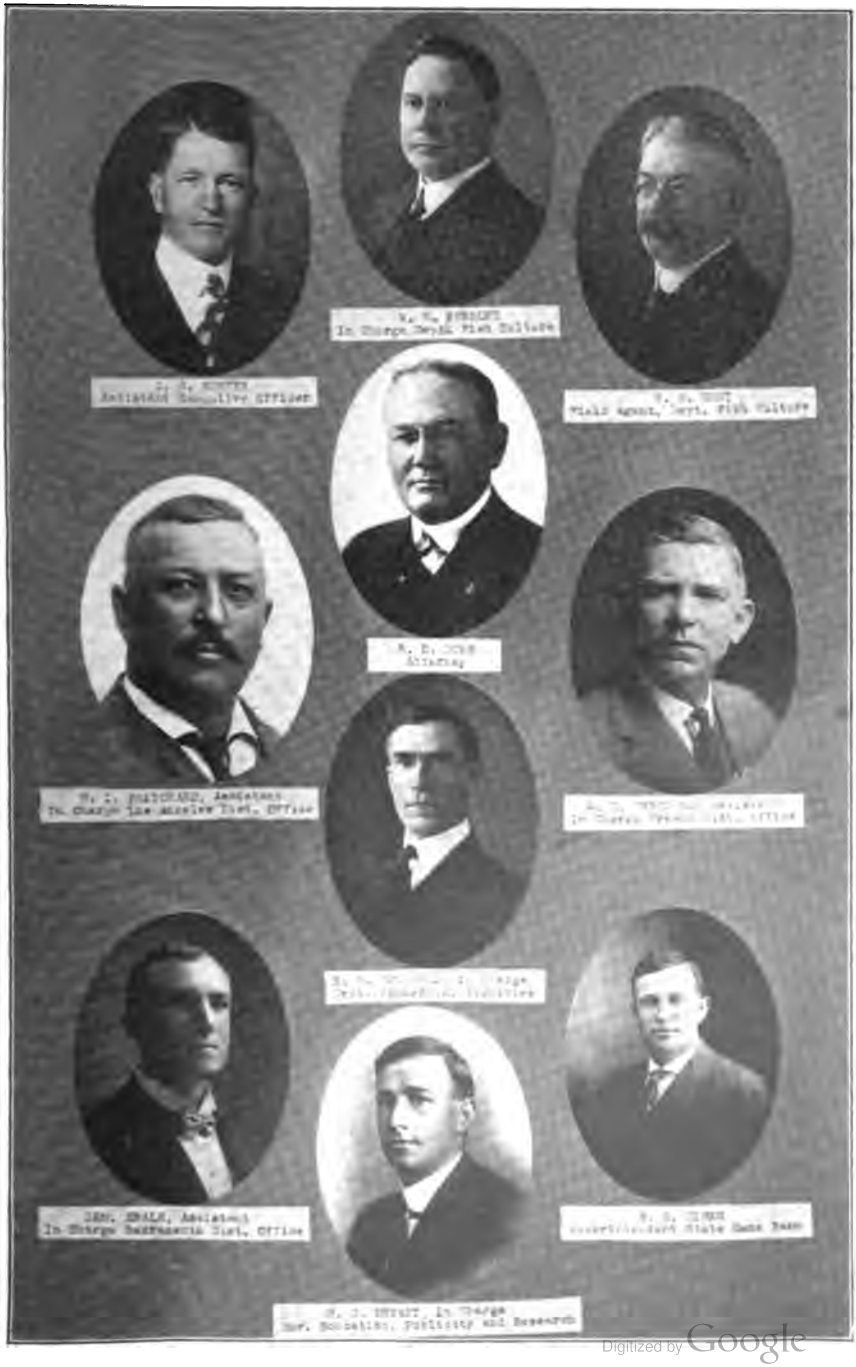
F. M. NEWBERT,
Président

M. J. CONNELL
Commissioner

CARL WESTERFELD,
Commissioner

ERNEST SCHAEFFLE,
Executive Officer

THE MEN WHO ADMINISTER CALIFORNIA'S WILD LIFE RESOURCES.


J. S. HUNTER
Assistant Executive Officer
W. H. SHEBLEY
In Charge Dept. Fish Culture
[illegible]
Field Agent, Dept. Fish Culture
[illegible]
Attorney
[illegible], Assistant
In Charge Los Angeles Dist. Office
[illegible]
In Charge Fresno Dist. Office
[illegible], In Charge
Dept. Commercial Fisheries
GEO. NEALE, Assistant
In Charge Sacramento Dist. Office
[illegible]
Superintendent State Game Farm
H. C. BRYANT, In Charge
Dept. Education, Publicity and Research

of the extraordinary size of California, which necessitates each warden patrolling an area in some instances as great as the state of Vermont. (See Fig. 6.)

Nevertheless, the fish and game laws are being enforced as never before. Not only are practically all offenders arrested, but convictions are had in almost every instance. We believe that the consistent enforcement of the game laws is a valuable educational force. Nothing deters the criminal so effectually as knowledge that all crimes will be punished with certainty. The favorable attitude shown by the people of this state at the present time is in part due to the systematic and relentless enforcement of fish and game laws.

In spite of a very severe winter in 1916, game conditions appear to be favorable. Several species of big game, such as antelope and mountain sheep, are little more than holding their own, but every effort is being made to save the remnant. Waterfowl and upland game birds are still to be found in abundance. That more and more men appear to be taking the field each year indicates that California's supply of fish and game is still large enough to encourage, rather than discourage, the hunter and angler. Increased interest in hunting and fishing is clearly evidenced by the augmented sale of licenses up to the end of the fiscal year 1914–15. Fewer hunting licenses were sold in 1915–16, but there are indications that there will be an increase this coming year. On the other hand, there was a marked increase in the number of anglers' licenses sold in 1915 (for detailed figures see p. 242).

Enforcement of Fish and Game Laws.

More arrests have been made and more convictions obtained in this than in any previous biennial period. The fish cases numbered 882 and the game cases 1205, making a total of 2087. Over 83 per cent of the total cases resulted in convictions, a higher percentage than is obtained in any other class of cases of like degree. The fines collected amounted to $33,415, and in addition 3103½ days of imprisonment were exacted from violators. Failure to secure a license led to the arrest of 424 hunters, 141 anglers and 140 commercial fishermen. Violations of the deer laws resulted in the arrest of 227 and violations of the trout laws 100. The fact that there were 115 convictions in non-game bird cases well shows the strong sentiment in favor of protecting songbirds (see p. 239). The increased number of arrests in the past few years indicates a more rigid enforcement of the game laws rather than an increase in violations.

Deputies of the commission have made 512 searches of markets, restaurants, private individuals, conveyances, etc., for illegal fish and game.

The seizures of illegal fish and game have been many. The more conspicuous totals are: ducks, 6695; geese, 1265; quail, 432; shore birds, 120; rabbits, 462; deer meat, 3802 pounds; trout, 5293 pounds; striped bass, 3900 pounds; salmon, 4195 pounds. All wholesome fish and game confiscated is donated to public and charitable institutions, from whom many grateful letters of acknowledgment have been received. Illegally used fishing apparatus, including nets, lines, etc., to the number of 337, have been confiscated. These represent about 12,668 fathoms, or 76,008 feet. This apparatus, after condemnation in superior courts, is destroyed or sold in accordance with law.

The Protection of Fish and Game.

Since the development of public sentiment is necessary to the proper conservation of wild life, emphasis has been placed on educational and publicity work. The Bureau of Education, Publicity and Research has been active in placing before the people of the state, by means of lectures, a quarterly bulletin, and newspaper items, the work of the commission and the needs of fish and game. The motto of this department is "Conservation Through Education." The quarterly, CALIFORNIA FISH AND GAME, has furnished a medium for the publication of statistical and financial reports and of facts regarding fish and game resources. This policy of keeping the people of the state informed of the status of, and the activities of the commission in conserving fish and game, has been instrumental in winning needed support for conservation measures and in increasing interest in the bird and animal life of the state. In preparation for further work of this kind and of future legislation a great deal of data has been accumulated. For example, the kill of deer has been annually compiled in order that there might be a basis for regulating the annual kill to the supply. Material in the form of teachers' bulletins has been issued and the attempt made to stimulate the teaching of nature study in the public schools. The proper education of children is a fundamental conservation measure. Such research problems as the food of the roadrunner, the food of ducks, and the status of introduced game birds have been undertaken and other economic and scientific investigations are contemplated.

The prosecution of such publicity as is being furnished by the Bureau, backed as it is by scientific research, will necessarily bring about a new era as regards wild life conservation. Knowledge of wild life and its needs assures good laws and the efficient patrol force helps to assure consistent obedience of them.

The newspapers of the state, especially those of southern California, have shown great interest in fish and game matters, and the publicity given by them has greatly aided the commission in successfully carrying forward its work.

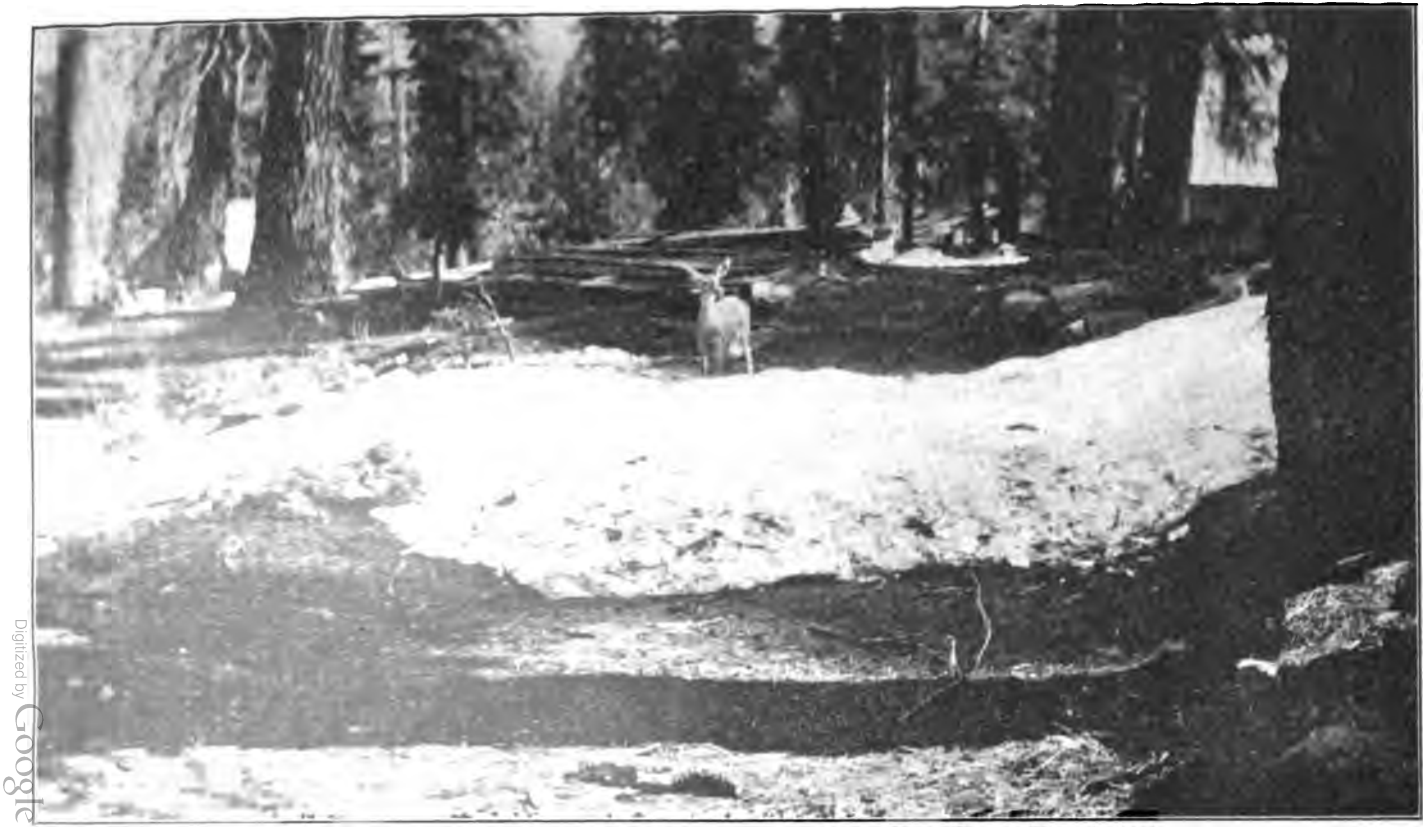


Fig. 2. A doe in the Sequoia National Forest. Photograph by L. D. Farmer, May 28, 1916.

At the Panama-Pacific International Exposition, the Fish and Game Commission, in cooperation with the California Academy of Sciences, installed an extensive exhibit depicting the wild life resources of California. Several habitat groups of game mammals were conspicuously placed in appropriate surroundings. To the south was a fine group of desert mountain sheep, to the west a group of black-tailed deer and to the north a typical hunter's camp among redwoods. In the camp were hung some of the different species of game birds, and tree squirrels and mountain blue jays were to be seen perched in the trees overhead. Between the major groups and placed in rocky caves were a black bear watching her cubs at play, and a mountain lion guarding her kittens while they fought over a dead fawn. An aquarium contained live golden trout from the Whitney region and representatives of other trout found in the state. Attractive colored booklets, giving facts in regard to fish and game and a statement of the reasons for saving the wild life resources of the state, were distributed by the assistant in charge of the information booth. Exhibits were also installed at the State Fair, the Chico Fair and at other county fairs.

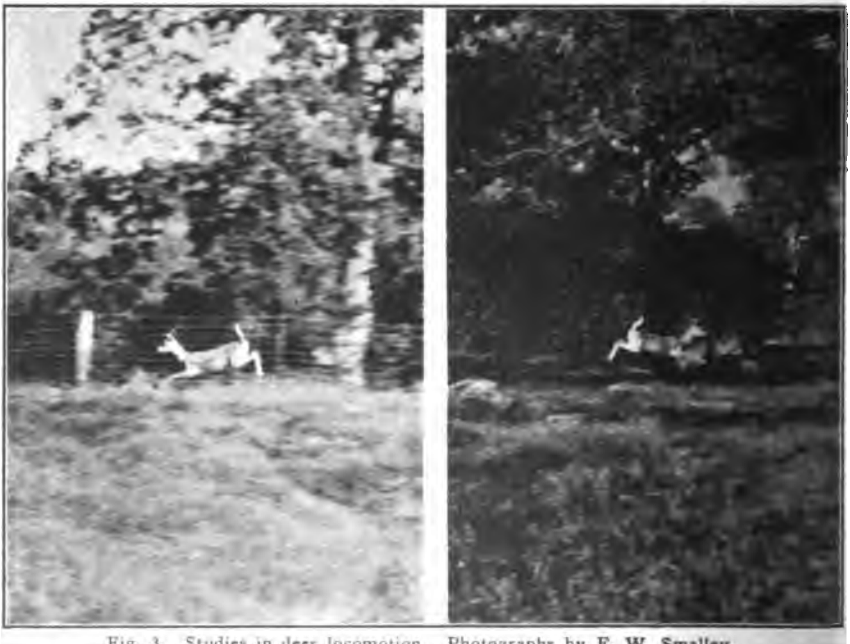


Fig. 3. Studies in deer locomotion. Photographs by E. W. Smalley.

Under the direction of Charles R. Gilmore, engineer-draftsman, the work of recording on maps accurate data on lakes and streams, which was instituted in 1912, has been continued. Eventually these maps will show the location of lakes and streams, the volume of water in

each, the fish plants made with data on the kind of fish, by whom planted, when planted and the expense attached thereto, and the ownership of the land bordering the principal fishing streams. The data will be of particular value in connection with future fish planting operations.

Proper fish and game protection and legislation must be based on accurate information on the abundance, distribution, food, habits and life history of each fish, bird and mammal concerned. This information is obtainable only through scientific investigations and the systematic collection of data. Two departments of the commission, the Bureau of Education, Publicity and Research and the Department of Commercial Fisheries, are actively engaged in making available the data necessary to the proper and efficient conservation of fish and game resources. Furthermore, the records of the status of fish and game and of the activities of the commission are being kept in such a way that endeavors in the future may profit by them and laws and conservation measures be planned accordingly.

Game Refuges.

In order to provide safe breeding grounds for game birds and mammals a number of game refuges have been established by legislative enactment. Prior to 1915 there had been created but two large state refuges. These were the Pinnacles National Forest Monument, situated in the counties of San Benito and Monterey, and a portion of the Cleveland National Forest, in Orange and Riverside counties. To these were added in 1915, an area in California Redwood Park, in Santa Cruz County, commonly known as the Big Basin, a portion of the Trinity National Forest, in Trinity County, and a large part of the Angeles National Forest, in Los Angeles and San Bernardino counties, the Trinity refuge comprising 64,000 acres and the Angeles 600,740 acres (see Fig. 6).

In addition to these state refuges there are a number of national reserves, such as the Klamath Lake Bird Reservation, in Siskiyou County, the Clear Lake Bird Reservation, in Modoc County, and the Farallone Bird Reservation, on the Farallone Islands. The national parks should be counted as refuges along with these reservations, for in them no hunting is allowed.

The combined state game refuges now occupy an area almost equal to the state of Rhode Island. There are 782,998 acres of national forest lands set aside as game refuges, where all hunting is prohibited, except that for predatory animals, under permit.

Still other additions to the game refuges of the state have been made under the law providing "that any person, firm or corporation, owning and in possession of patented land in the state of California embracing

Google

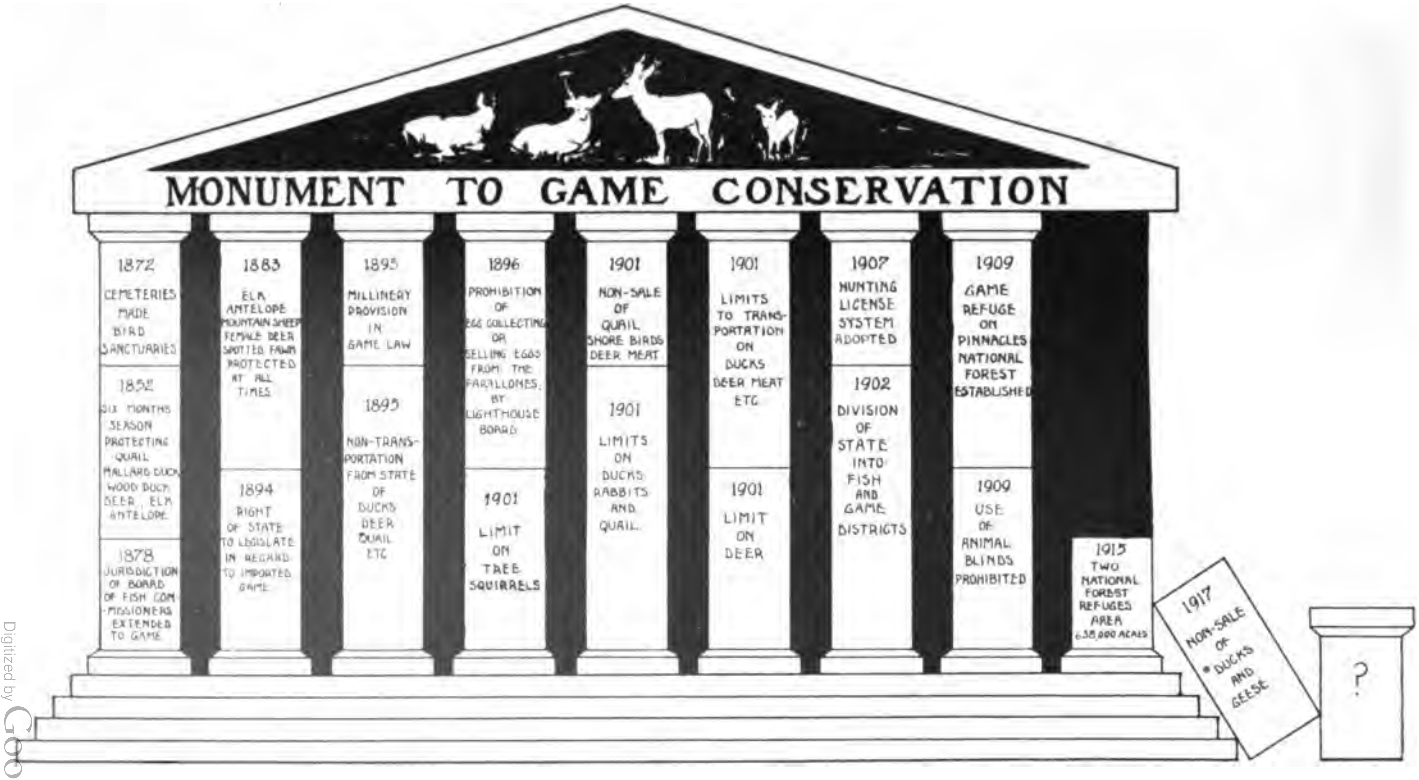

MONUMENT TO GAME CONSERVATION
1872 CEMETERIES MADE BIRD SANCTUARIES
1852 SIX MONTHS SEASON PROTECTING QUAIL MALLARD DUCK WOOD DUCK DEER, ELK ANTELOPE
1878 JURISDICTION OF BOARD OF FISH COM-MISSIONERS EXTENDED TO GAME
1883 ELK ANTELOPE MOUNTAIN SHEEP FEMALE DEER SPOTTED FAWN PROTECTED AT ALL TIMES
1894 RIGHT OF STATE TO LEGISLATE IN REGARD TO IMPORTED GAME
1895 MILLINERY PROVISION IN GAME LAW
1895 NON-TRANS-PORTATION FROM STATE OF DUCKS DEER QUAIL ETC
1896 PROHIBITION OF EGG COLLECTING OR SELLING EGGS FROM THE FARALLONES, BY LIGHTHOUSE BOARD
1901 LIMIT ON TREE SQUIRRELS
1901 NON-SALE OF QUAIL SHORE BIRDS DEER MEAT
1901 LIMITS ON DUCKS RABBITS AND QUAIL
1901 LIMITS TO TRANS-PORTATION ON DUCKS DEER MEAT ETC
1901 LIMIT ON DEER
1907 HUNTING LICENSE SYSTEM ADOPTED
1902 DIVISION OF STATE INTO FISH AND GAME DISTRICTS
1909 GAME REFUGE ON PINNACLES NATIONAL FOREST ESTABLISHED
1909 USE OF ANIMAL BLINDS PROHIBITED
1915 TWO NATIONAL FOREST REFUGES AREA 638,000 ACRES
1917 NON-SALE OF * DUCKS AND GEESE
?

Fig. 5. A monument to game conservation in California. Much has been accomplished, but there is still much to be done.

an area of not less than 160 acres, may transfer, by an instrument in writing, * * * to the state of California to preserve and protect all wild game on the land described therein, for a period of not less than ten years." On February 1, 1916, John S. Bryan of Hollister transferred to the state of California the right to preserve and protect for ten years all wild game on his ranch of 8570 acres, situated in the Gabilan Range, in Monterey and San Benito counties. The establishment of other refuges of the same sort is contemplated. The creation of a reservation around Santa Catalina Island, where all fishing except with hook and line is prohibited, will improve, doubtless, the angling for large game fishes. The waters surrounding the island in reality become a refuge for the small fish which form the food of the tuna, black sea bass, albacore and yellowtail.

The wisdom shown in providing sanctuaries where game may increase undisturbed is already apparent. These sanctuaries will in time act as important and permanent sources of supply, the increase spreading into the surrounding country to furnish food and sport.

Legislative Results.

Among the many important laws passed by the last legislature was the one enlarging the jurisdiction of the commission. For many years the board had legal jurisdiction only over fish. Later game was placed under its control. The extension of its control so that the "protection and preservation of wild mammals, wild birds, fishes, mollusks, crustacea and all forms of aquatic animals and plants" comes under its jurisdiction, has made it possible to more effectually administer the wild life resources of the state. The song-birds are a natural resource as well as the game birds, and the conservation of the plankton of the sea is a prerequisite of abundant fish life. The existing interrelation between the different forms of wild life is so intimate that it were folly to administer one without the other.

The attempt to redistrict the state more satisfactorily, although perhaps causing some inconvenience on the part of the hunter and fisherman, has been productive of beneficial results. Not all kinds of fruit grow in the same locality. Nor does the same kind of fruit ripen at the same time in the lowlands and in the high mountains. The same is true of game and fish, and because there is such a wide variety of species and of conditions, conservation is dependent upon a districting system that will equalize as nearly as possible the hunting and fishing season and the privilege granted the hunter and fisherman. It may appear sometimes that the arbitrary lines drawn work an unnecessary hardship, but it should be remembered that the lines must be drawn somewhere.

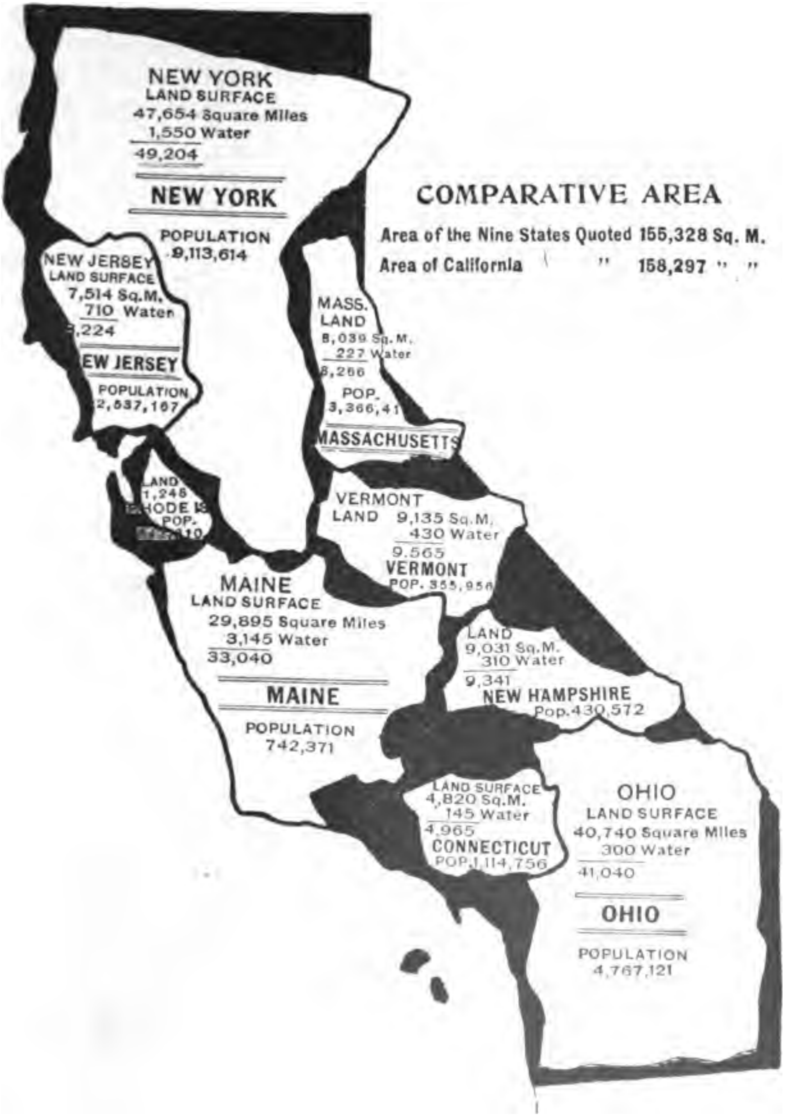


Fig. 6. Map of California, showing comparative area. Courtesy Southern Pacific Company.

Believing that the commercialization of game means early extirpation, the commission has continuously advocated a law prohibiting the sale of all game. Laws already prohibit the sale of all game birds with the exception of ducks and geese, but these birds have been killed in large numbers for the market. The point at issue, however, is more largely the control of the market hunter rather than the actual sale of birds on the market. Experience has shown that nothing short of absolute prohibition of sale will successfully stop the operations of the man who hunts for market. Furthermore, the fact that 300,000 ducks were sold in the markets of San Francisco alone in 1912 is evidence that the sale of ducks must be stopped if an undiminished supply is to be maintained. The result of the referendum vote on the nonsale-of-game bill was an indication of a lack of knowledge of the facts rather than a condemnation of the law. A valid principle underlies this needed law and in justice to neighboring states, all of which have such a law, California should see that market hunting is eliminated.

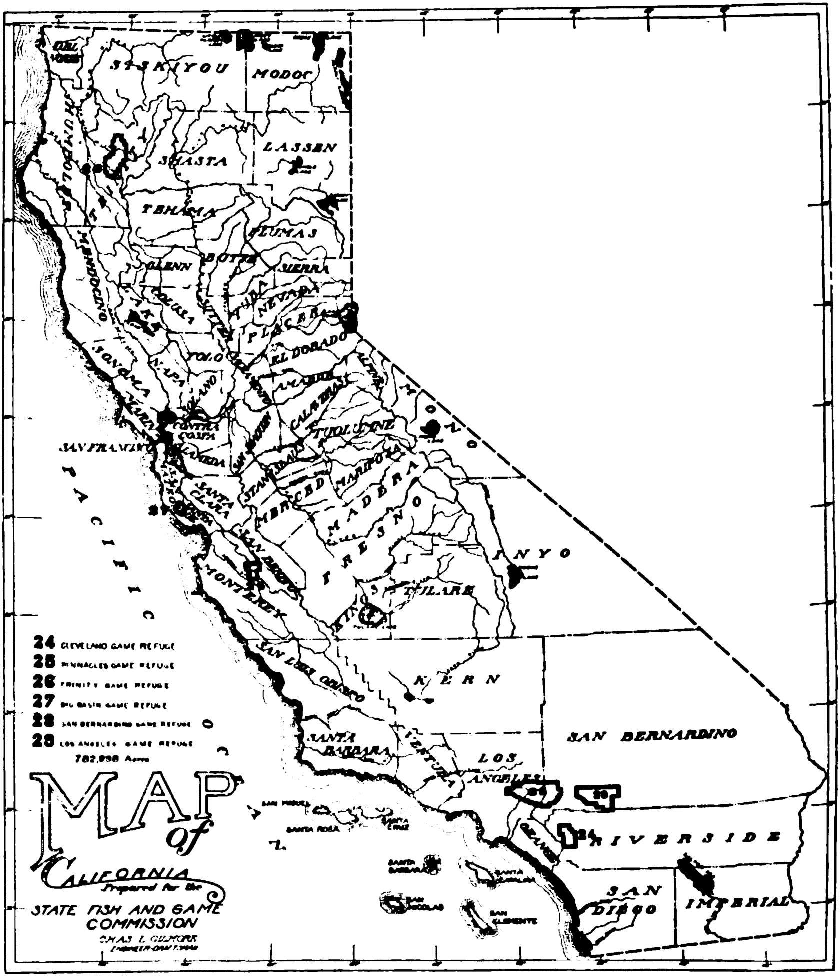


Fig. 7. Map of California, showing state game refuges.

Other laws enacted in 1915 are proving their worth. The state laws were made to conform with the Federal Migratory Bird Law, thus shortening several seasons and giving needed protection to geese. Bag limits on waterfowl and upland game birds were also materially reduced, thus going a step farther than the federal law. The additional protection given salmon by the prohibition of netting in the Sacramento River above Vina and the making of a closed season from May 15th to the close of the year for the district between Vina and Colusa, has resulted in a notable increase in the fish ascending the McCloud River. The legislation regulating the operations of commercial fishermen is assuring the conservation of the fishery resources. The law giving protection to the spiked buck has been widely observed and unanimously indorsed. The uniform season for rabbits and quail has been instrumental in keeping the gunner out of the fields until the young quail have matured. Although the rabbit may sometimes be a pest, yet if we profit by the experience of Pennsylvania this game mammal of the common hunter must be carefully protected. Pennsylvania is now attempting to restock the state with rabbits. The dove season is now much more satisfactory and band-tailed pigeons have received needed protection. The elimination of ''bull hunting'' has proved to be a wise conservation measure. The future will still more clearly demonstrate the value of the new and amended fish and game laws of the 1915 legislature.

The District Offices.

On account of the vast area of our state and in order that the work of the commission in the various parts might be expedited, there have been created three administrative divisions, the San Francisco, Sacramento and Los Angeles. The head office is located in San Francisco. Here are also the offices of the departments of Fish Culture, Commercial Fisheries, Licenses and Bookkeeping.

Assistants working in the San Francisco Division patrol an area covering 46,000 square miles with a population of nearly 1,500,000. The Sacramento office attends to the work of the commission in the Sacramento Valley and the northeastern part of the state, covering an area of 43,347 square miles with a population of nearly 500,000. The Los Angeles office is in charge of the southern part of the state which has an area of 56,435 square miles and a population of nearly 1,000,000. For several years, the commission maintained an office in the San Joaquin Valley at Fresno. It was deemed expedient to combine this office with the San Francisco office early in the year 1916. Mr. A. D. Ferguson, who had been in charge since the division was created, was made Field Agent with duties extending into all parts of the state.

Conspicuous among the activities of the Sacramento Division have been the winter feeding of game and the seining of fish from overflowed lands.

During the severe winter 1915–16 it soon became apparent that large numbers of deer and quail would starve unless feed was provided for them. Deputies were ordered to procure feed and to stimulate the interest of others in the work. As a result. many hundreds of deer and quail were supplied with food until the melting of the snows again furnished them a natural supply (see Figs. 8, 9, 10 and 11).

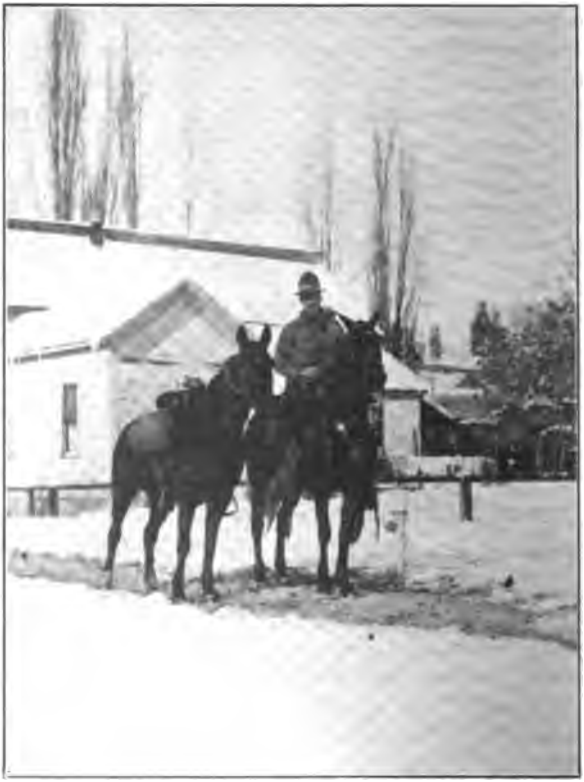


Fig. 8. Deputy O'Connor of Grass Valley, Nevada County, leaving on horseback to feed quail during severe weather, winter 1915–1916.

The drying up of overflowed bottoms in the Sacramento Valley annually causes a great loss in fish life. No more practicable method of conserving the valuable fishery resources of the great valleys has been found than is demonstrated in the efforts to seine out and plant in other places the fish which would otherwise die with the drying up of these overflowed areas (see Figs. 12 and 13). The Sacramento District office has carefully watched the areas where this danger exists and has been instrumental in saving thousands of black bass, perch, catfish, crappie and sunfish.

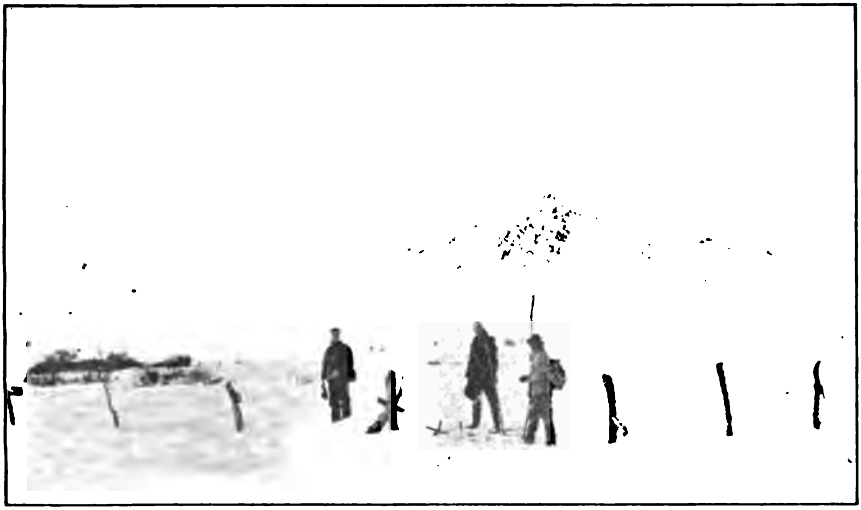


Fig. 9. Deputy E. H. Ober of Big Pine, Inyo County, and assistants feeding quail during severe weather, winter 1915–1916.

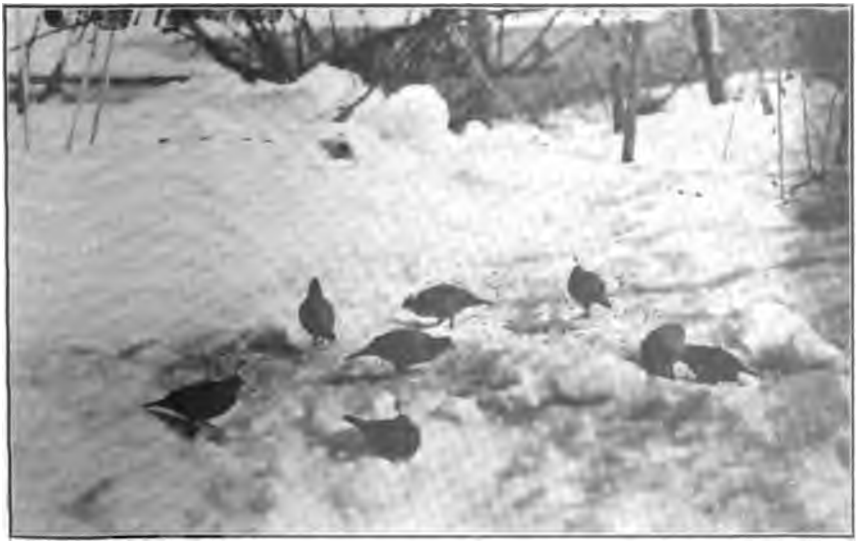


Fig. 10. Valley quail being fed at Bishop, Inyo County, during severe weather, winter 1915-1916. Thousands of quail were saved because fed by Fish and Game Commission deputies.

In addition to routine work the Los Angeles District office has carried on a noteworthy publicity campaign. The activities of the Southern Division office and the fish and game resources of the south have been given wide publicity. In addition study has been made of the commercial fisheries, which are yearly growing more important (see pages 80–100). The maintenance of a breeding stock of quail in Inyo County is due largely to the efforts of this division in feeding the birds during the severe winter weather of 1916. Many deer were also saved from starvation.

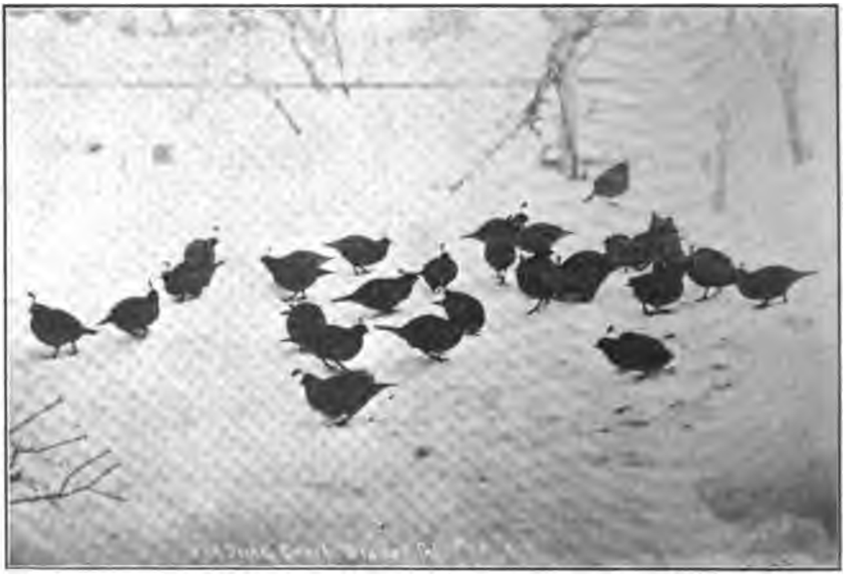


Fig. 11. Feeding quail, winter 1915–1916, at Bishop, California.

The San Francisco District office has a most difficult problem in the large alien population of the Bay cities. Effort has been largely concentrated on the strict enforcement of the fish and game laws pertaining to the coast districts (see pages 135–137). The legal shipments and sale of game in San Francisco have been carefully supervised, and due to the activities of the efficient patrol service the illegal shipment and sale of game has been practically eradicated. The transfer companies, which were subterfuges by the commission houses to evade the limit law on ducks, have been put out of business and further attempts to evade the law by making parcels post shipments have been prevented.

The Fresno Division office has been instrumental in greatly improving fishing conditions in the Sierras. Trout fry have been carried by pack train to the most isolated streams and lakes. The range of the beautiful golden trout has been greatly extended and several stocking experiments

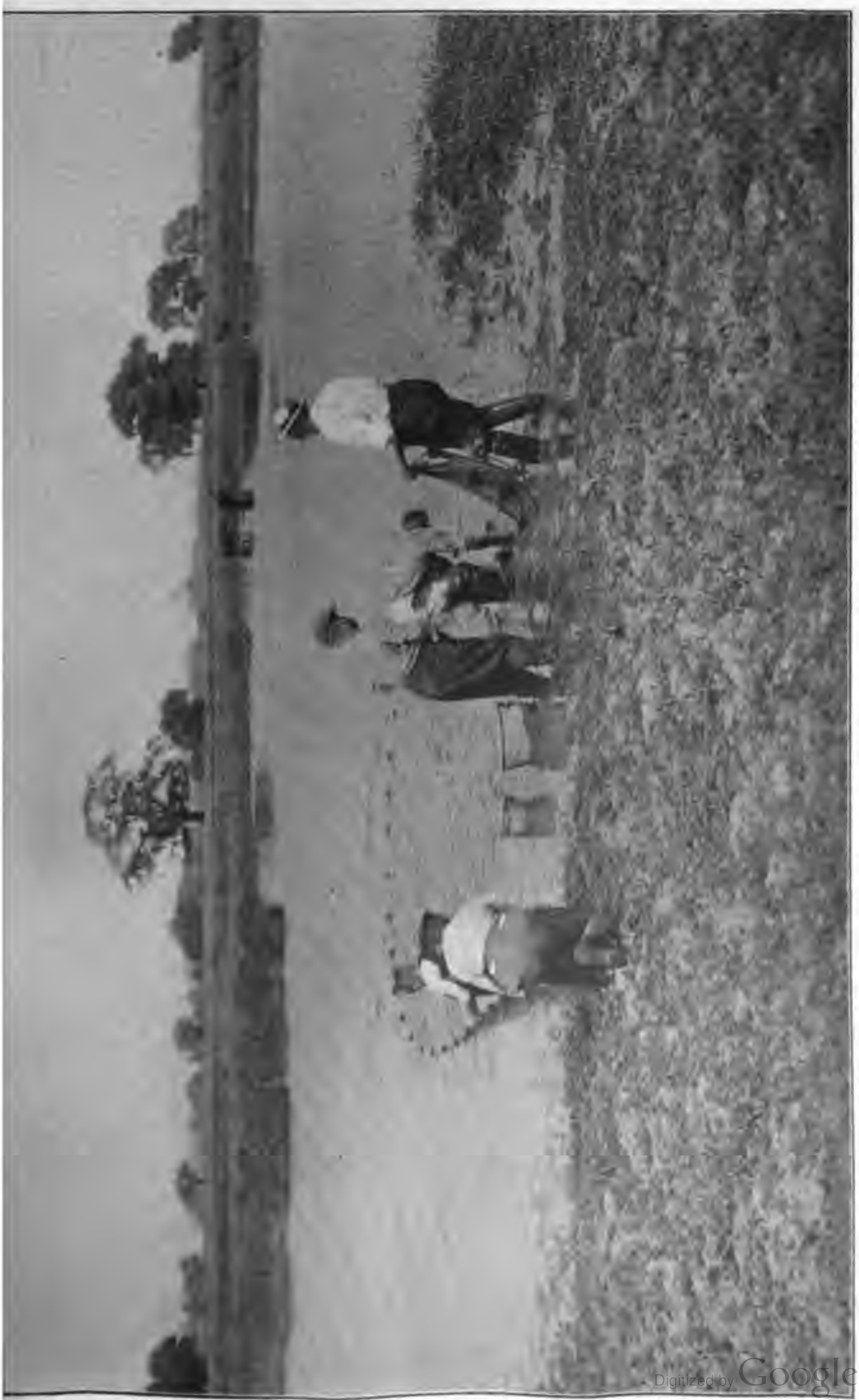


Fig. 12. Seining fish from overflowed areas in the Sacramento Valley. Photograph by McCurry Company.

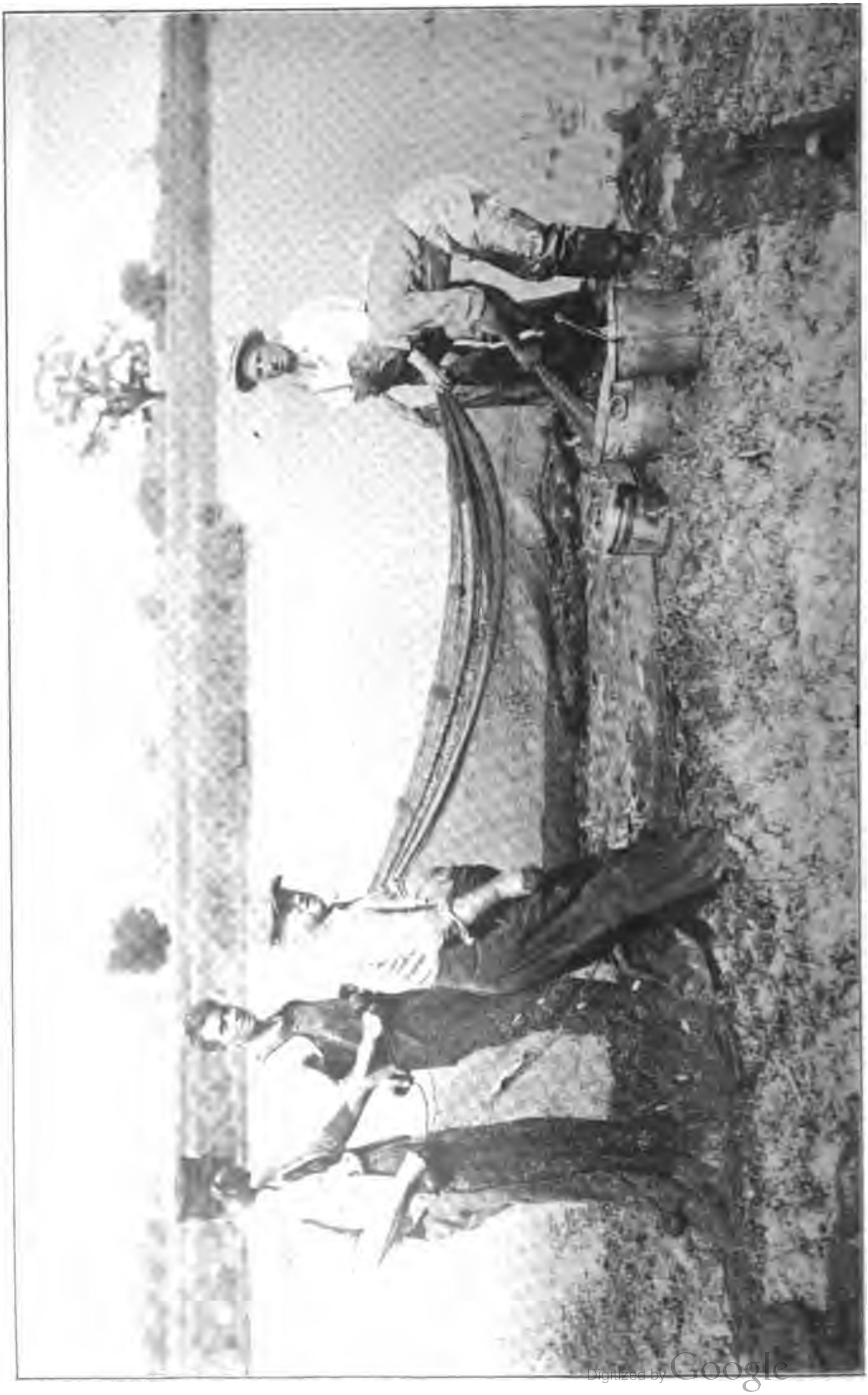


Fig. 13. Seining fish from overflowed areas. Thousands of fish are saved from death with the drying up of the ponds and are used for planting in streams. Photograph by McCurry Company.

of value have been instituted. Of particular interest is the experiment now under way, devised to test the present theory regarding steelhead trout. A number of these trout have been placed in barren waters in the high Sierras where they will be landlocked. It is hoped that the experiment will demonstrate whether this sea-run form will revert quickly to the landlocked form (see pages 147–153).

The attempt has been made to stop, as far as possible, the pollution of waters by refuse from wineries, sugar factories, gas plants, and oil refineries. Many investigations have been carried on to determine the amount of pollution, and many manufacturing companies have been forced to install filters and other devices for preventing pollution. Marked improvement is to be noted in the type of equipment used. The old straw filter used for obtaining lampblack has been succeeded by three types of mechanical filters—the Oliver, the Kelly and the Butters, the latter of which appears to be the most successful. We are glad to acknowledge the cooperation of all of the larger companies. They have willingly expended thousands of dollars in the attempt to prevent waste destructive to fish from entering the waters of this state. For a more detailed report, see pages 127–134.

There has been a steady reduction in the number of lion bounties paid and it is evident that mountain lions have become greatly reduced in number. As a consequence thousands of deer are saved each year. Bounties were paid on 162 lion scalps in 1915 and on 111 between January 1 and June 30, 1916, as against 482 in 1908, 361 in 1909 and 333 in 1910. Without taking into consideration cattle and sheep, the saving in deer alone has more than justified the total expenditure of $49,160 during the last nine and one-half years, during which time the bounty has been in force. We are glad to report that there has been little or no fraud connected with the payment of lion bounties. A claim for each lion must be made upon a blank form and this must be signed by the claimant and three witnesses and acknowledged before a notary or justice of the peace. In addition, the claim must be accompanied by an account of the pursuit and killing of the lion, giving details as to the method used, the number of deer carcasses left by the animal, and such other facts as may be of assistance in determining the damage done to deer and other game. Two litters of young animals sent in were found to be on examination the young of coyotes. There was no evidence, however, that the men making application for bounties on these animals were not sincere in their belief that they were young mountain lions. It may be that the lion bounty should be increased in order to still further reduce the species.

The above are a few of the many activities of the commission directed toward the better protection of fish and game.

The Patrol Force.

There are in the employ of the California Fish and Game Commission sixty-eight assistants or deputies who do active patrol duty. Additional temporary assistants are employed during the open seasons. The regular assistants are stationed in various parts of the state where fishing and hunting conditions are the best and in centrally located places from which they can cover to the best advantage the district allotted to them. The assistants are not bound by any arbitrary lines but are expected to extend their activities into adjoining districts. In this way, there is left no unguarded area such as there would be if they were bounded by fixed lines.

Each assistant is encouraged to work with the one in charge of the adjoining district and whenever help is needed to bring violators to justice, the two are expected to assist each other as fully as possible. Deputies are often concentrated in one locality to apprehend chronic violators and new men are sent into old territory in order to make the work more effective.

All of the employees and assistants of the Fish and Game Commission are now under civil service regulations. The assistants are selected after a rigid examination. This examination, consisting of two parts—one written, the other oral—is given by a board of examiners, the members of which have had many years of experience in the enforcement of the game laws. In the oral examination, the candidate is called before the examiners. Each examiner then checks on a form the various characteristics of the applicant—his appearance, health, decision, manner, information, reliability, ambition, body-build, alertness—in fact, every characteristic that has any bearing upon the duties to be performed. Questions are asked that are intended to bring out the candidate's understanding of game and fish conditions and his ability to look after himself and camp stock under all conditions and his understanding of what game conservation really means. In this way, the candidates peculiarly fitted for practically every branch of the service are secured. Although ratings are made separately by each examiner, invariably the same conclusion in regard to the candidate's fitness is reached. The written part of the examination includes questions that will bring out the candidate's idea as to the meaning of the various laws, his ability to tell from hypothetical questions as to whether a violation has occurred and his knowledge of the habits of the various species of game to be found in the state. None of the questions is particularly difficult and should be found easy by the candidates having a general knowledge of the duties of an assistant and of the interpretation of the game and fish laws. By reason of the care taken in the selection of assistants, it will be possible in a few years to have a force of men who not only have the natural ability, but who have a very deep interest

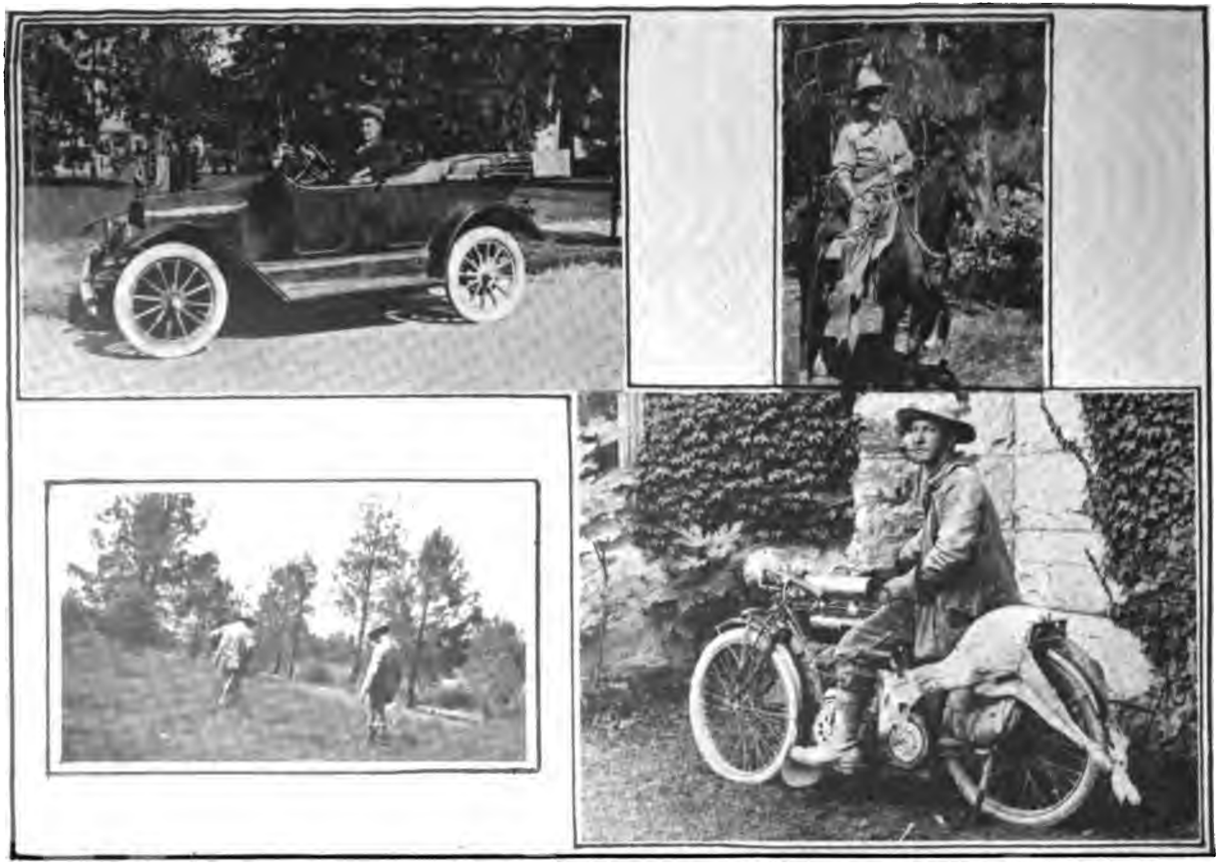


Fig. 14. The deputy at work. Transportation is made by automobile and motorcycle, and on horseback and on foot. The deputies pictured are I. L. Koppel, Raymond O'Connor, J. H. Hill and C. A. Scroggs.

in the conservation of fish and game. Without these qualifications no one who is charged with the enforcement of the game laws can be successful.

During the past several years, the Fish and Game Commission has had an auxiliary force of unsalaried assistants. In certain instances excellent results were obtained through these men, but in general the results were very disappointing. Most of them did not take an active interest in law enforcement. Some of them even used their badge to cover up their own and their friends' violations. Frequently very flagrant violations were overlooked and more frequently petty cases were sworn to that should have been handled outside of court. At the time that the Workmen's Compensation Act went into effect, it was realized that the expense of carrying insurance on the army of special assistants was not warranted—a ruling from the Attorney General being to the effect that the commission was liable for accidents that might occur. On this account it was decided to cancel the appointments of all special deputies.

A "Manual for Deputies," arranged by Messrs. A. D. Ferguson, George Neale, R. D. Duke, J. S. Hunter, and W. H. Shebley, was published in May, 1914. This manual deals with the more important phases of a deputy's problems, and gives an insight into the powers and duties of deputy fish and game commissioners. It is of particular value to the newly appointed officer. The six divisions of the Manual appear under the heads: Qualifications, Arrests, Expense, Routine and Forms, Decisions and Civil Service Regulations. The following quotations from Part I, show the standards which are set for deputies of the California Fish and Game Commission:

> *Qualifications*—A deputy fish and game commissioner should be honorable in all his dealings; whether with the public, his superior officers or his fellow deputies. The eye of the public is upon him; the honor of the commission is in his keeping. A deputy is out of place in the great and important work of conservation in which the California Fish and Game Commission is engaged unless he can command the respect of those with whom he comes in contact. Even the most persistent lawbreaker is bound to respect the self-respecting, upright officer, though he bring him to justice and punishment. * * *
>
> *Energetic*—The good things in his line do not come to the deputy who waits for them. The duties of the deputy fish and game commissioner are peculiar in that—unlike a sheriff or other peace officer, who usually acts upon information furnished by others—the deputy must, from the nature of things, himself take the initiative. He must not only do patrol duty in the ordinary sense of the word, but he must endeavor to anticipate the movements of those who would violate the fish and game laws. He must be ever alert. He should thoroughly post himself on those sections wherein

> the fish and game laws are most frequently violated. He should study the methods of the professional game law violators. He should cultivate the friendship of law-abiding people and open channels for information concerning those things of which he ought to get early knowledge.
>
> *Courageous*, but courteous, is a qualification which goes far in the making of a good officer. A timid man can accomplish little; an overbearing one can do more harm than good. * * *
>
> *Tactful*—Poise is essential. A reputation for making arrests on frivolous grounds or for being too easily persuaded to drop prosecution is alike detrimental to the deputy's chances for efficiency. No hard and fast rule can be laid down as to when to make arrests; the deputy must exercise his judgment. But on general principles no consideration of prominence or influence, when the offending party is of the age of mature judgment, should cause the deputy to deviate from his attitude of dispassionately but firmly insisting that the law be vindicated. * * *
>
> *Relations with other officers*—The position of deputy fish and game commissioner is unique as compared to other officers of the state, county, or municipal governments, inasmuch as his duties are at once executive, administrative and educational. While his jurisdiction conflicts in no way with that of other peace officers nor theirs with his, yet sheriffs, constables, policemen, harbor officers, and inspectors of various arms of municipal governments are all in a position to render him invaluable assistance. The deputy should earn the confidence and respect of all such officers that their cooperation may be ready and voluntary. * * *

Under the heading "Arrest" the deputy is directed when to make an arrest, how to make an arrest, what degree of force may be used, and what disposition is to be made of a prisoner. What kind of expenses may be incurred by the deputy in the discharge of his duties, and the manner of presenting his claims for reimbursement is described under the heading "Expense Claims."

The efficiency of the patrol service has been greatly improved in the past few years because of the increased facilities of transportation which have been provided. Most deputies now have automobiles; others motorcycles. An allowance of a certain amount per mile, while the automobile is used in connection with a deputy's work, covers expenses and upkeep. The distance which can be covered in patrol work is thus increased many times and the tracing of all violators made possible. Four patrol boats are now in service and Evinrude motors make the use of smaller patrol boats possible on the rivers during certain seasons. However, a large patrol boat for use in enforcing commercial fisheries regulations along the southern California coast and offshore islands is essential to the proper enforcement of laws and the gathering of needed scientific data.

Propagation of Game Birds.

Little effort has been made to continue the introduction of foreign game birds. Believing that sufficient attempts have been made to stock the state with ring-necked pheasants, and that the game farm has not proved its worth, the efforts at propagation on the farm have been curtailed. Consequently, but few ring-necked pheasants have been reared, and only a few hundred birds have been liberated. In order that breeders might be furnished information as to the possibilities in quail and duck breeding, the farm has been stocked with valley quail and wild ducks and experiments carried on to determine the success which can be obtained in artificially rearing them. The main justification for a game farm appears to lie in its value as a station for carrying on breeding experiments, the results of which will benefit game breeders, rather than in its value as a practical means of increasing game. Judging from the experience of other states it seems best that the greater amount of effort be placed on the conservation of native species rather than on the introduction of foreign ones which are apt to supplant valuable native species, become pests, or introduce some infectious disease. A detailed report on the activities of the Game Farm can be found on pages 120–126.

Fish Culture.

In order that hatchery operations might be better administered the office of the Department of Fish Culture was moved from Sisson Hatchery to San Francisco in the fall of 1915. W. H. Shebley was placed in full charge of the department and E. W. Hunt was appointed Field Agent with the detail work of the hatchery and the car messenger service under his supervision. G. H. Lambson, of the United States Bureau of Fisheries, formerly superintendent of Baird Hatchery, qualified through civil service as superintendent of the Sisson Hatchery. These changes have greatly facilitated the work of this department.

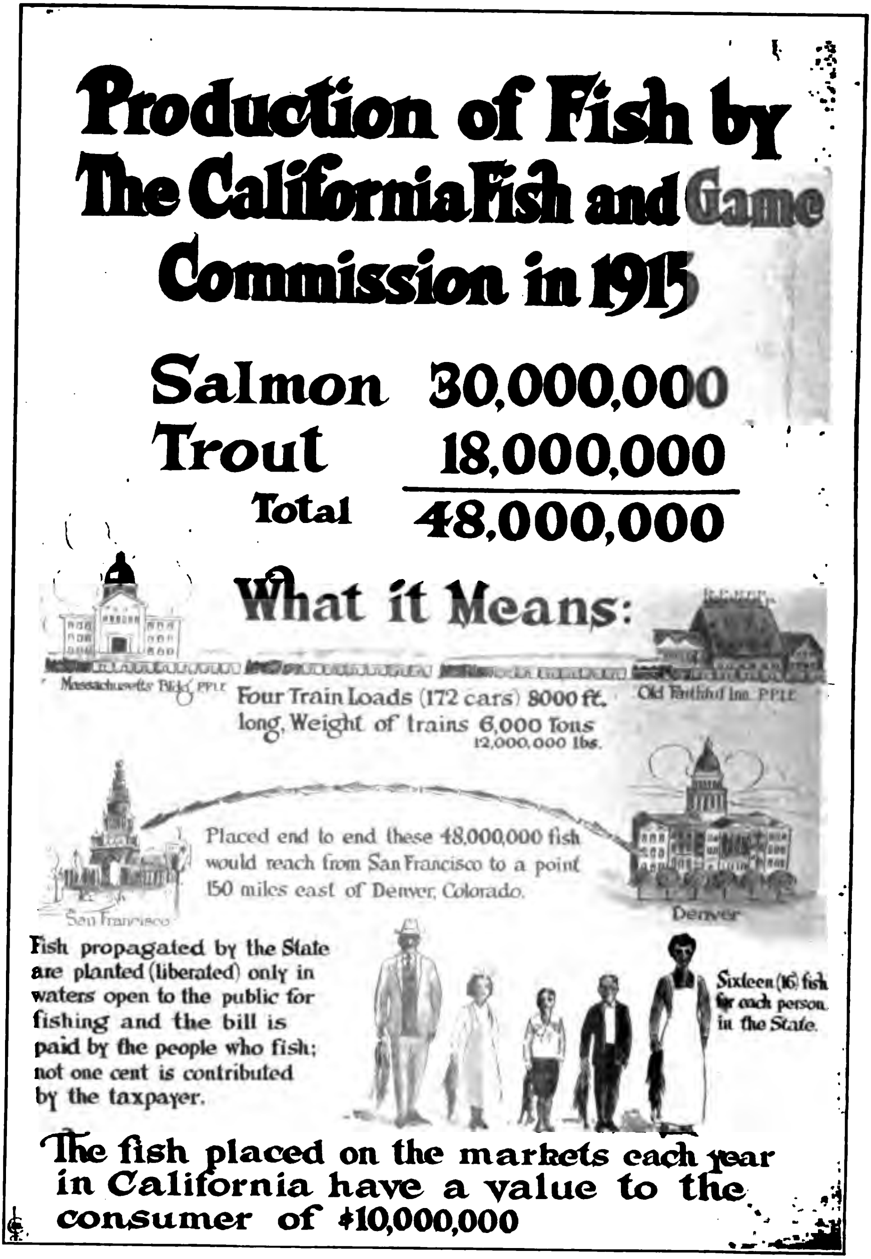
The hatcheries of the state have propagated a larger number of fish in this than in any previous biennial period. During the season of 1915 alone, 48,000,000 fish were planted in the streams of California, a number sufficient to furnish every resident of the state with sixteen fish (see Fig. 16). Eight hatcheries and six egg collection stations have been operated to their full capacity and the present stations will have to be enlarged and new ones installed in order to meet the increasing demand for trout fry. An additional hatchery building has been erected at the Sisson station, making five buildings in all. With this added equipment it is possible to hold the fry until they attain a better growth and hence are better able to withstand the changed conditions incident to planting.

As in past years, the salmon eggs procured from the United States Bureau of Fisheries have been hatched at this station and the fry carefully reared and fed until they were two or three months old, at which time they were distributed in the Sacramento River and tributary streams near Sisson, and in the Klamath River. In addition, a large number of fry have been held in ponds until they were eight months old. They were then distributed in the Klamath and Sacramento rivers early in the fall. Experience has shown that the best results in salmon culture are to be obtained by rearing several million fry on the upper reaches of the Sacramento River where the water is pure and cold and where the fry can be liberated in the headwaters of the Sacramento out of reach of the predatory fishes which infest the river lower down.

Fig. 15. A view of Mt. Shasta, at the southwestern base of which is situated the Sisson Station, the largest hatchery in the state. The snows on this mountain help furnish a pure cold water supply for the hatchery.

So large a number of trout fry were reared at the Sisson station that two cars had to be employed in the distribution of these fish. A baggage car was rented from the Southern Pacific Company and equipped with a gasoline engine and aerating system (see Figs. 20 and 21).

It has been found that the retaining of a stock of brood fish in the ponds gives a dependable supply of eggs each year. The take of eggs in the rivers, on the other hand, is variable. The pond system is therefore being improved. There were on hand in the ponds at the Sisson Hatchery on July 1, 1916, over 300,000 brood fish.



Production of Fish by The California Fish and Game Commission in 1915

Salmon	30,000,000
Trout	18,000,000
Total	48,000,000

What it Means:

Four Train Loads (172 cars) 8000 ft. long, Weight of trains 6,000 Tons 12,000,000 lbs.

Placed end to end these 48,000,000 fish would reach from San Francisco to a point 150 miles east of Denver, Colorado.

Fish propagated by the State are planted (liberated) only in waters open to the public for fishing and the bill is paid by the people who fish; not one cent is contributed by the taxpayer.

Sixteen (16) fish for each person in the State.

The fish placed on the markets each year in California have a value to the consumer of $10,000,000

Fig. 16. Fish distributed in 1915.

The Tahoe hatcheries have been operated to their full capacity during the last two seasons. It is planned to acquire a new site for the Tallac Hatchery where fry can be held until later in the fall. Fry if reared to a large size stand a better chance of survival after being planted in the Lake. The Department of Fish Culture is planning to make increased efforts to propagate lake trout (*Salmo tahoensis*). This valuable fish should be increased in number by artificial propagation. New varieties of game trout should be added to the native species now found in Lake Tahoe.

Brookdale Hatchery was operated during the season of 1915–1916 under a lease procured from Santa Cruz County. As a return for the use of the hatchery Santa Cruz County annually received 500,000 steelhead trout fry to be distributed entirely in the public waters of that county. Over 3,000,000 fish were reared at this hatchery in 1915 and over 1,500,000 in 1916.

The Ukiah and Fort Seward hatcheries reared both steelhead and rainbow trout. At the Fort Seward station 140,000 black-spotted trout, obtained from Lake Almanor, were reared and distributed in the Mad and Eel rivers. The situation of this hatchery is such that it can also be used for salmon culture. Next year an attempt will be made to obtain a supply of eggs from the Eel River.

The Bear Valley Hatchery, established by San Bernardino County, has been operated by the commission during the past two years. All of the fry reared were planted in Big Bear Lake and nearby streams of San Bernardino County. Adverse conditions hindered operations in 1916 and the output was therefore below normal.

The new temporary hatchery installed at Lake Almanor Dam, in Plumas County, had a successful season in 1916. At this station 1,635,000 rainbow trout eggs were collected and held until ready for shipment. Plans are being made for an additional egg taking station at Domingo Springs, one mile from Rice Creek Falls. This egg collecting station will help furnish a supply to the Almanor Hatchery.

The egg collecting station established on Hat Creek in 1915 had to be abandoned because of the tremendous flood of mud sent down the Hat Creek Valley as a result of the eruption of Mount Lassen. Not only were operations necessarily suspended, but all the fish in the stream, from its source to its confluence with the Pit River, were destroyed. This was one of the most serious destructions of fish life in recent years in California.

A location for a Southern California hatchery has finally been selected and what will be the most up-to-date hatchery in the world is now being built on Oak Creek, in Inyo County. The hatchery building, 192½ feet by 45 feet, is being constructed of natural stone, gabro and granite taken from the floor of the valley nearby and will cost approximately $60,000. The lower floor will contain, in addition to the hatchery room, offices, storerooms and a laboratory, and the second floor will furnish quarters for the help. The most up-to-date plumbing will be used. The location of this hatchery is unique, with snow-capped Mt. Whitney, the highest peak in the United States, in the background and Death Valley, 427 feet below sea level, seventy miles to the southeast—the roof and the cellar of the United States. The situation on Oak Creek will furnish an abundance of pure, cold water and eggs for the hatchery will be obtained at the Rae Lakes in the Sierras, at an elevation of 10,500 feet, reached by crossing a pass 13,000 feet in elevation. The rising generation may be able to point to this hatchery as the finest and most beautiful one in the world. This new hatchery will be able to supply fish to all points in southern California and as far north as Merced and the Yosemite Valley.

THE OLD AND THE NEW.

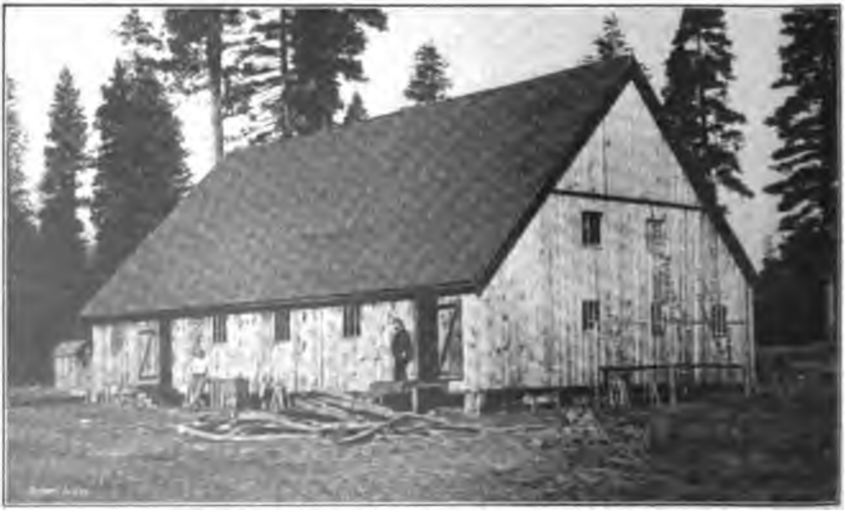


Fig. 17. The Sisson Hatchery in 1894.

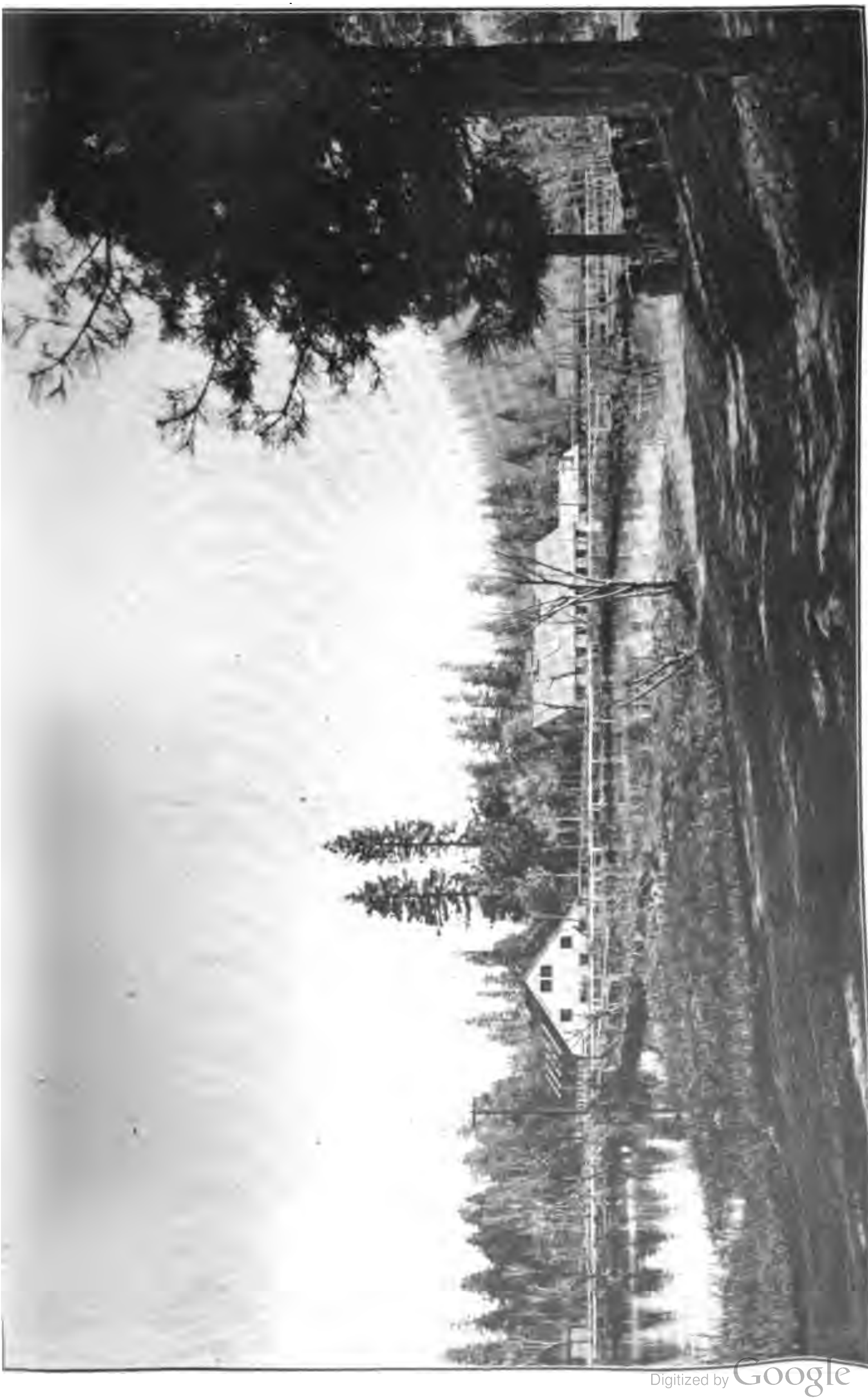


Fig. 18. The Sisson Hatchery in 1916. On the grounds are five large hatchery buildings, several smaller hatching houses, and cottages for employees. Photograph by Union Lithograph Company.

FROM HATCHERY TO STREAM.

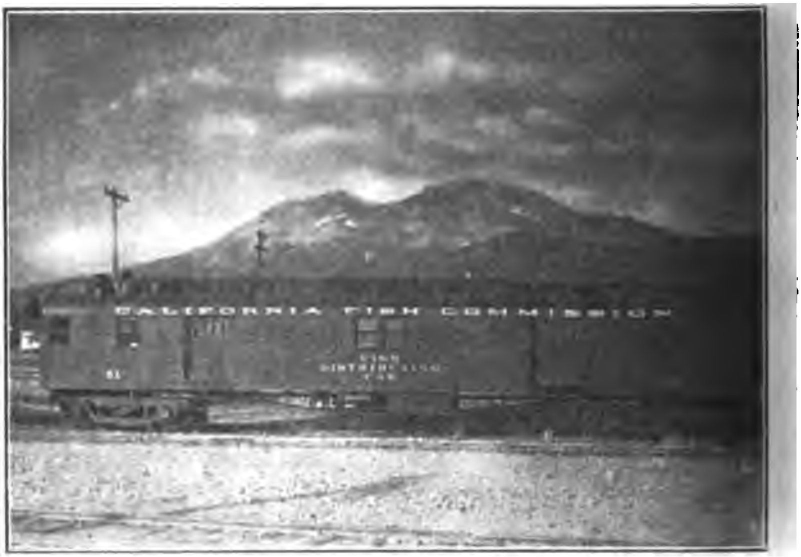


Fig. 19. Fish car No. 1.

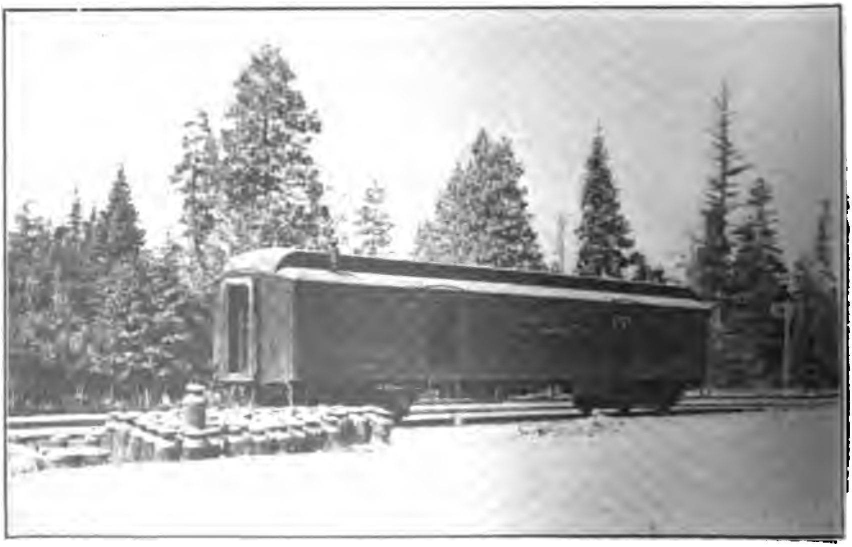


Fig. 20. Fish car No. 2 on the siding at Sisson.

FROM HATCHERY TO STREAM.

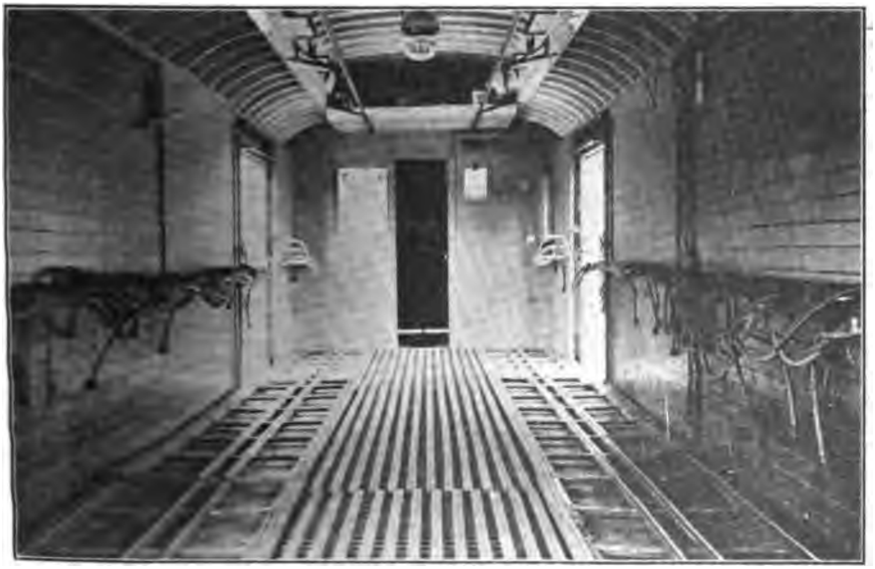


Fig. 21. Interior of fish car No. 2, showing aerating apparatus.

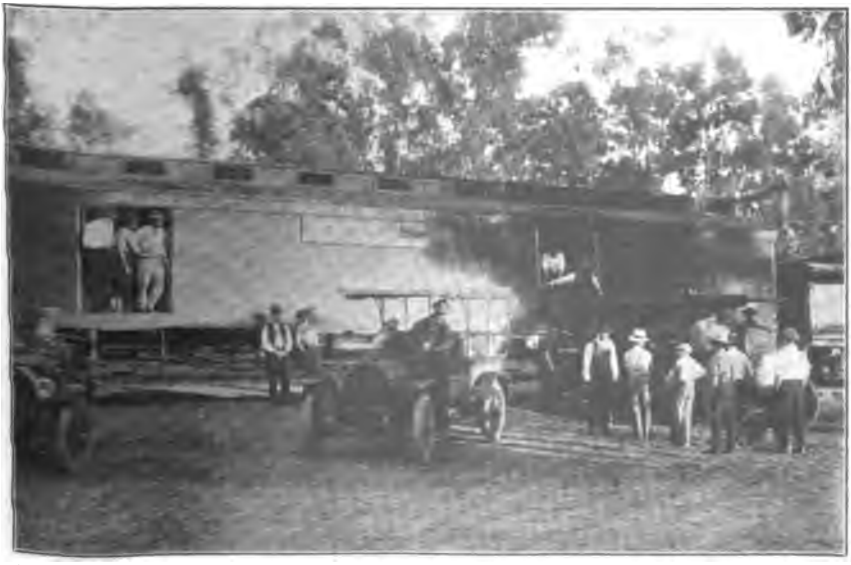


Fig. 22. Receiving fish from fish car preparatory to planting. Photograph by McCurry Company.

FROM HATCHERY TO STREAM.

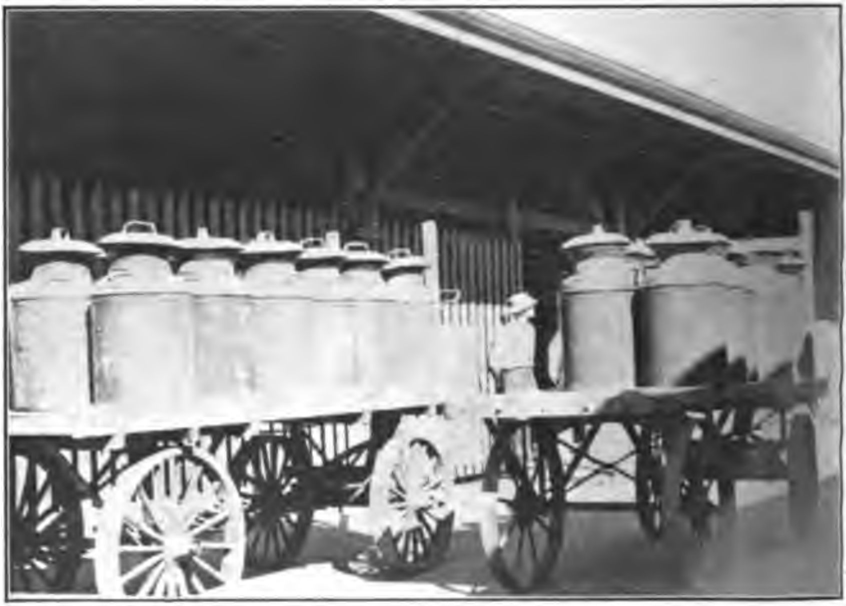


Fig. 23. Trout being removed from fish car at station.

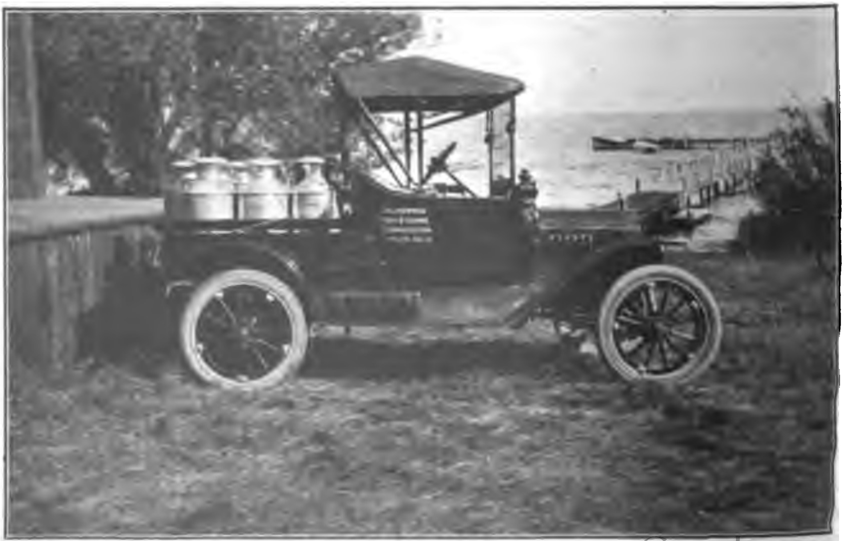


Fig. 24. Truck No. 3, one of the automobiles used in fish planting operations at Lake Tahoe.

FROM HATCHERY TO STREAM.

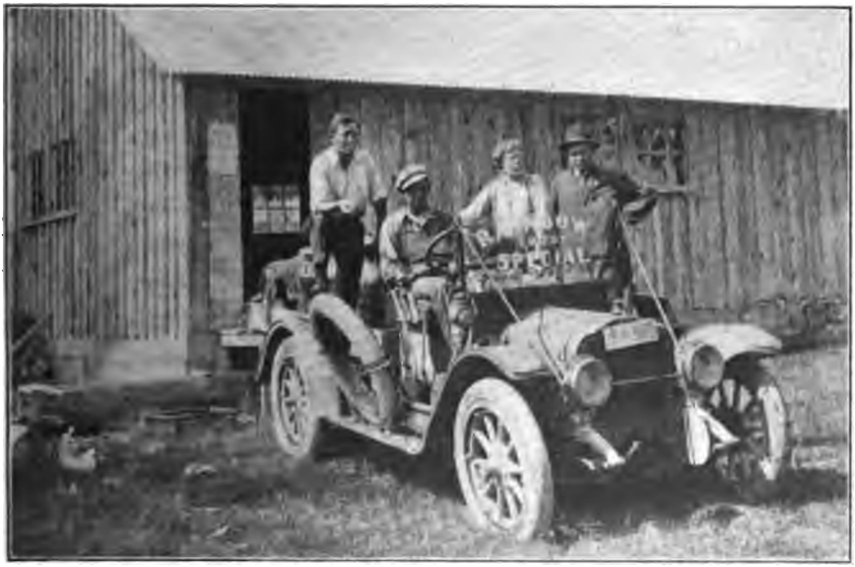


Fig. 25. Fish planting by automobile in San Bernardino County. The Bear Valley Hatchery in the background.

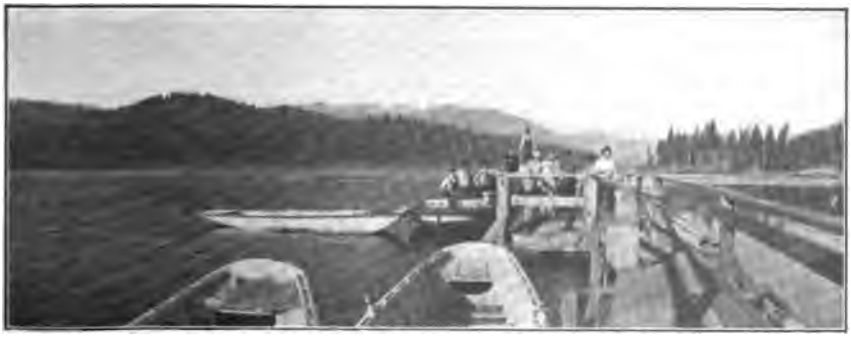


Fig. 26. Transportation of fish by boat preparatory to planting in Huntington Lake, Fresno County. Photograph by A. D. Ferguson.

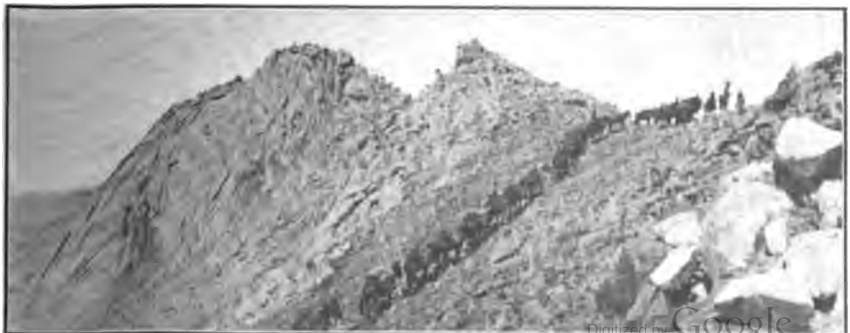


Fig. 27. Transportation by means of pack-train in the high Sierras. By using this means of transportation it is possible to plant many streams otherwise inaccessible. Photograph by A. D. Ferguson.

FROM HATCHERY TO STREAM.

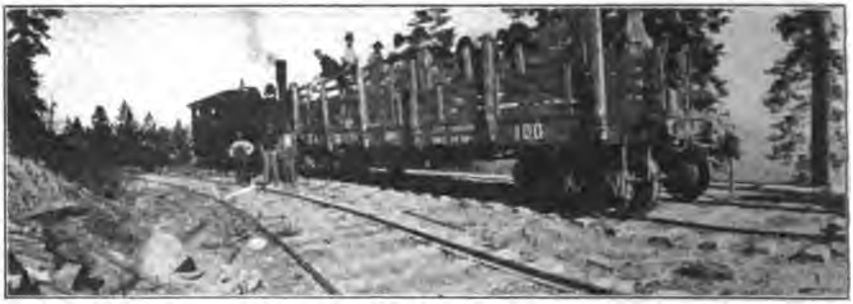


Fig. 28. Trout being transported to high mountain streams by means of a logging train. Photograph by A. D. Ferguson.

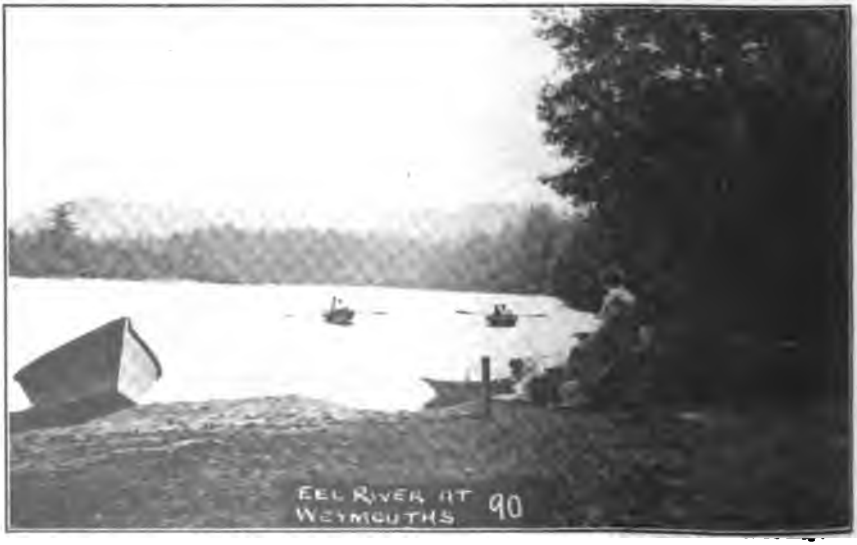


Fig. 30. Steelhead fishing in the Eel River.

FROM HATCHERY TO STREAM.

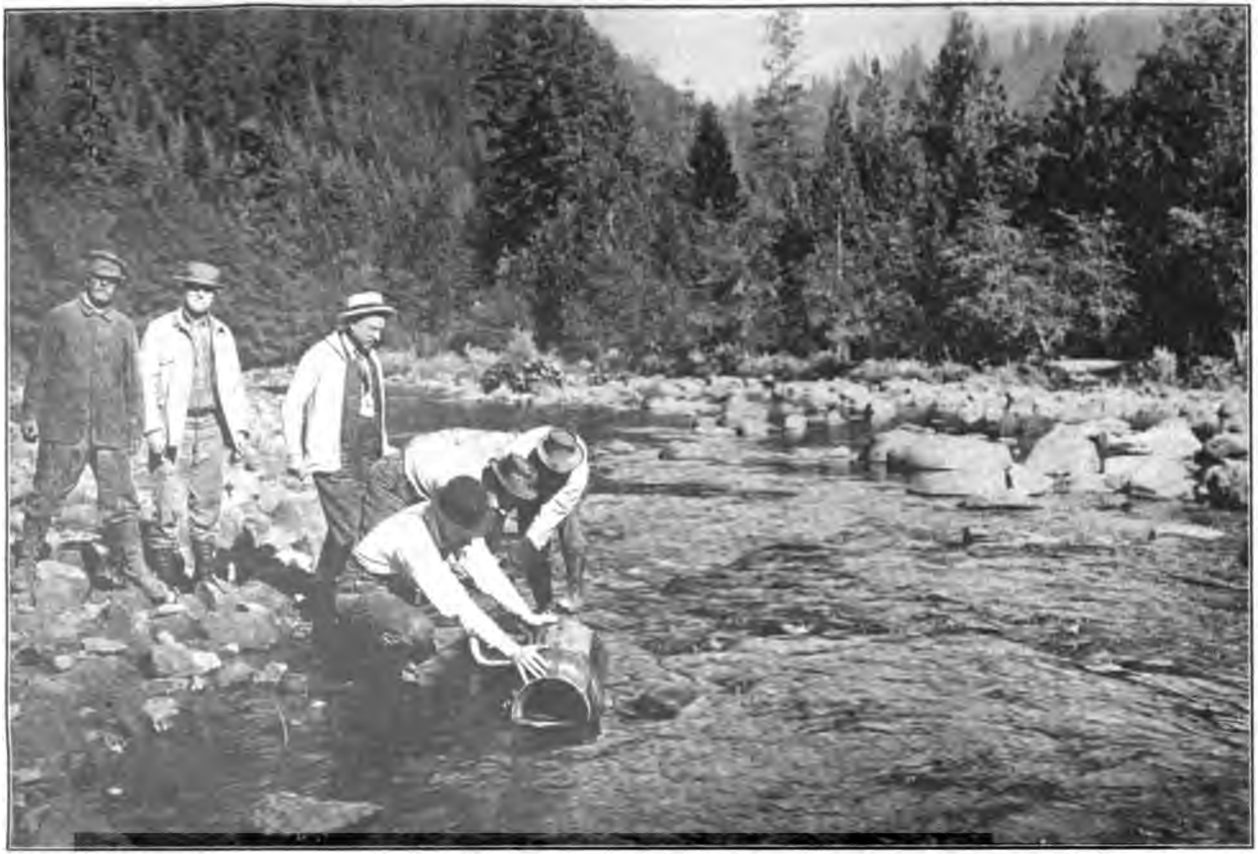


Fig. 29. Planting 20,000 trout at Maple Grove, near Placerville, California. Copyrighted photograph by F. W. Smith.

The falling off in the supply of shad in the Sacramento and San Joaquin rivers has necessitated investigations leading towards the institution of shad propagation. Shad were originally introduced into California by the Fish Commission in 1871. The fish for stocking were procured from eastern states. Within a few years shad became very abundant and they have continued so until recently. On the other hand, shad in the eastern states from which they were obtained have greatly decreased in numbers and requests have been received from the Massachusetts and Connecticut commissions for shad eggs for use in their hatcheries. In order to determine whether shad culture is feasible in California an experimental station was erected on the Sacramento River at Yuba City. Experiments proved that shad eggs can be successfully hatched and the fry kept free from bacteria and fungus. It is planned to hatch several million shad and striped bass this coming year. For further details of the fish cultural work see pages 54–79.

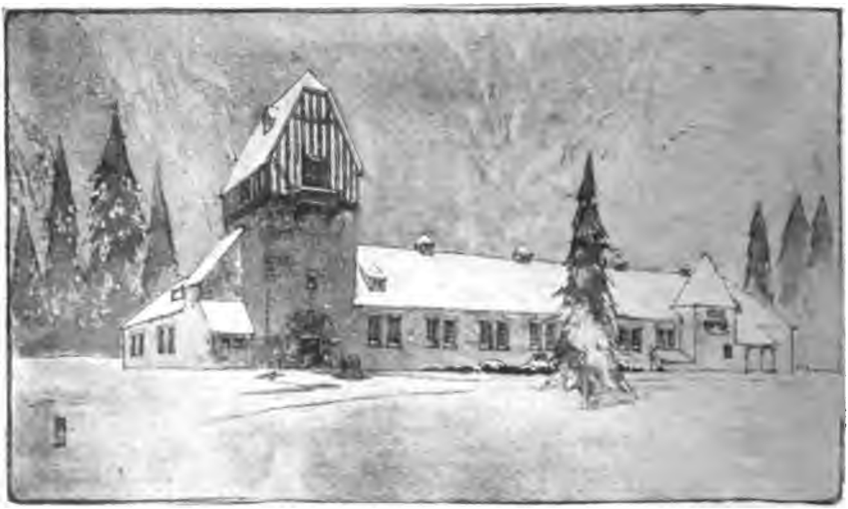


Fig. 31. Architectural drawing of the new Inyo Hatchery, situated on Oak Creek, Inyo County. This hatchery, located near the state highway, will, when completed, be the most modern hatchery in the United States.

Although the supply of fish in our streams does not appear to be decreasing, yet new conditions may endanger the supply. The number of anglers is increasing each year. Furthermore, each angler is increasing his annual catch. Streams which were formerly inaccessible are now reached with ease by means of automobiles. Consequently, greater and greater demands are made upon our hatcheries. To meet this demand new stations must be established and old ones enlarged. It also may be that some limitation upon the number of fishing days per week or the making of a shorter open season will alone counteract the effect of the ever increasing catch.

If there were no other justification for the existence of the Fish and Game Commission it could well rely upon the results of its attempt to stock the streams of the state with fish. Hundreds of lakes and streams formerly barren of fish life now contain millions of fish and these fish furnish food and recreation for all who will cast a fly or drop a line. Trout are now to be found in nearly every living stream easily accessible to the angler. Furthermore, there have been introduced into the waters of the state a number of food and game fishes not formerly found here. Black bass, striped bass, shad and several other species now add greatly to our fishery resources. Due to the activities of the commission the state of California offers as fine fishing as can be found anywhere, for there are far more fish in the lakes and streams than there were when the white man first came to the state.

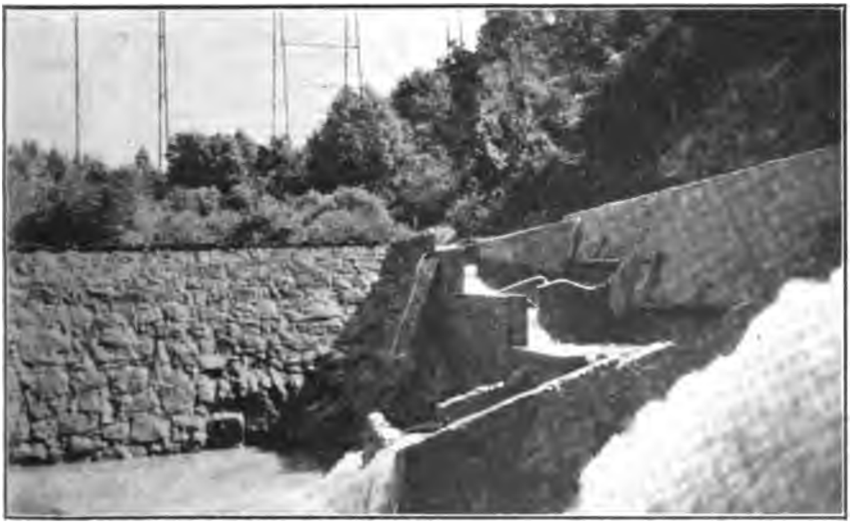


Fig. 32. Fishway built by Pacific Gas and Electric Company on Bear River, Placer County. Photograph by A. E. Culver.

Fishways and Screens.

Considerable progress in the installation of fishways and screens has been made. Eighty-six suitable fishways have been constructed at many places where fish have been unable to ascend streams because of dams or some natural obstruction, and ninety-two other sites have been surveyed. By the removal of large boulders and other natural obstructions the breeding grounds of fish have been greatly extended. In one instance more than 100 miles of spawning grounds were added by the removal of such an obstruction.

Experience has shown that the largest canals can be screened and the flow of water be undiminished. Even the work of cleaning has been reduced to a minimum. Large revolving screens which work in sections can be quickly cleaned by turning a crank, thus saving the labor attached to the cleaning of a parallel-bar screen. The cost of a 50-foot screen of this type is approximately $2,200. With the exception of the San Joaquin Valley, where some of the large canal owners are resisting the order to install screens, we have met with willing cooperation. Nearly 600 surveys have been made and 377 screens have been installed.

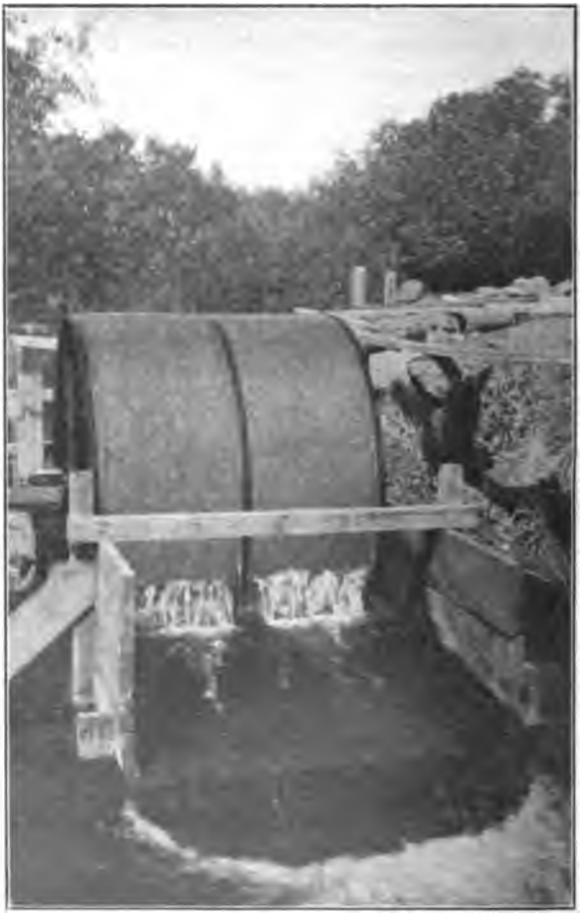


Fig. 33. Screen installed in an irrigating ditch near Edgewood, Siskiyou County. Fish are prevented from entering this ditch, but the flow of water is unhampered. Photograph by A. E. Culver.

Commercial Fisheries.

The rapid growth of our fisheries has necessitated more detailed and accurate knowledge in order that our fishery resources may be intelligently conserved. The Department of Commercial Fisheries, established in 1914, has been making careful study of the coast fisheries and has been gathering data which will be valuable as a basis for future legislation. A law enacted by the last legislature requires dealers and handlers of fish to make accurate monthly statements of the quantities and varieties of fish handled. These reports are being systematically compiled and the statistics regarding fishery products are being published in CALIFORNIA FISH AND GAME. Study has been made also of fish marketing and the department is at present cooperating with the State Market Director in attempting to unite the producer, the dealer and the people for their mutual benefit, and in fixing the maximum price the consumer should pay for fish. Largely due to the fact that accurate data was supplied the Market Director by this department of the Fish and Game Commission, splendid results have been obtained.

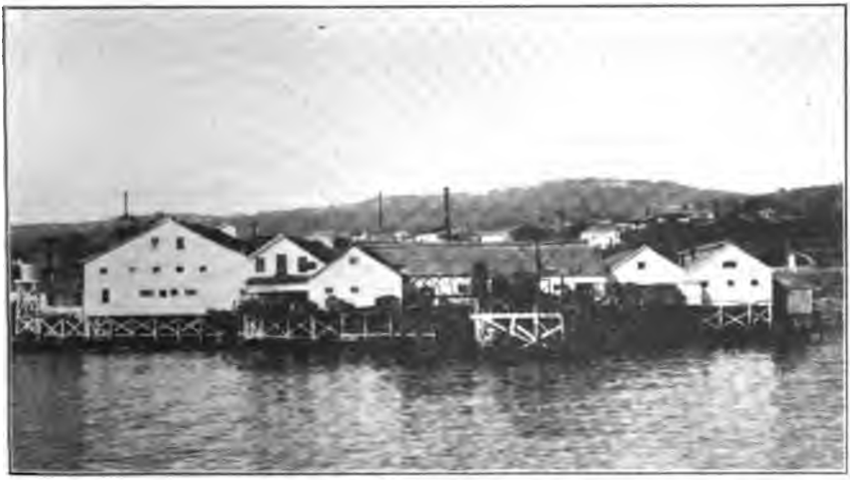


Fig. 34. Monterey Packing Company's plant at Monterey. Here large quantities of salmon are canned and mild-cured, and sardines canned. Photograph by H. B. Nidever.

A large number of marked salmon fry were liberated in the Sacramento River, Scott's Creek and San Lorenzo River in 1911 and 1912. A considerable number of these fish which have returned to the same streams have been obtained and data as to the age at which salmon seek fresh water, which is of much importance, is accumulating. Further experiments of this kind have been instituted.

Several important developments in California fisheries have necessitated careful study in order that control measures might be instituted. Of particular import is the growth of the long-finned tuna or albacore industry. The output of canned tuna now is more than double the value of the output of salmon or sardines. The tuna packers themselves are anxious to know more about the migration and life history of

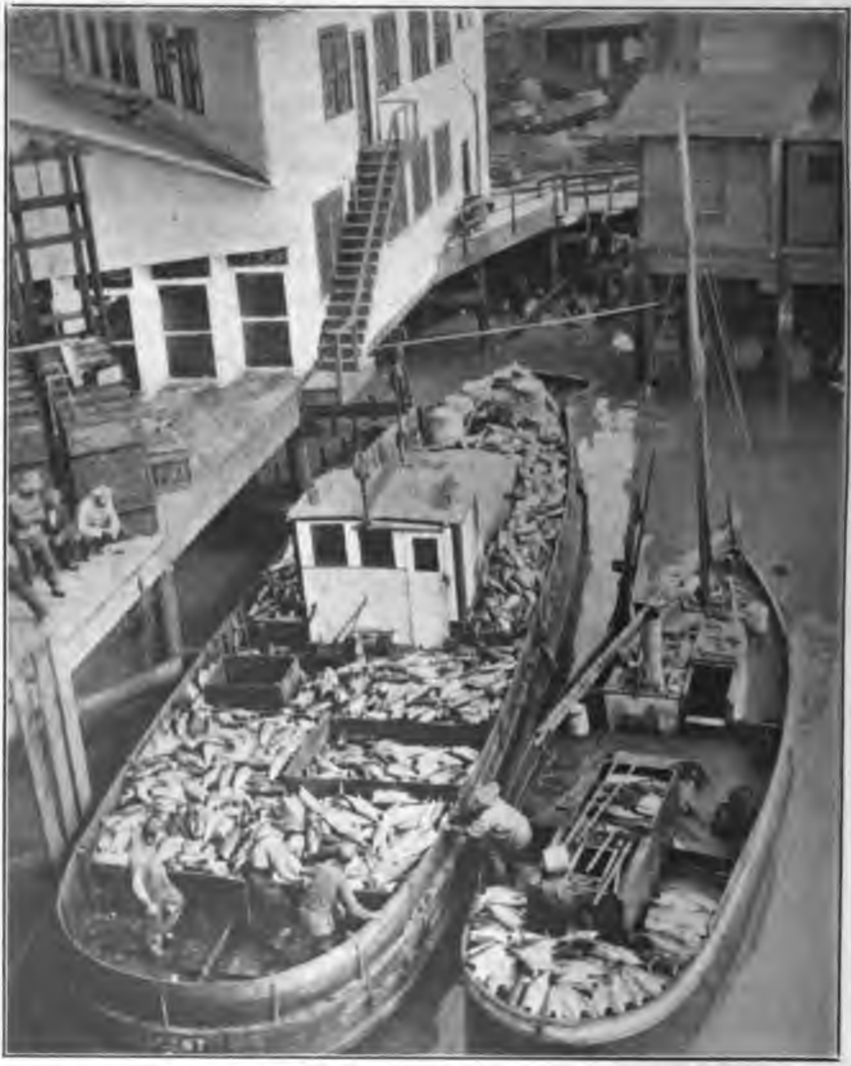


Fig. 37. Ready to unload tuna (albacore) at Van Camp's tuna cannery, 1914.

neglected. Many species of shellfish found in abundance along the coast would make excellent food were people educated as to their value. Furthermore, the soft-shell clam from the Atlantic coast could be profitably distributed here in bays where it does not now appear. There is also a future for oyster culture in California. To stimulate interest in these undeveloped fishery resources and aid in developing them is one feature of the work of the Department of Commercial Fisheries. For further details see pages 80–101.

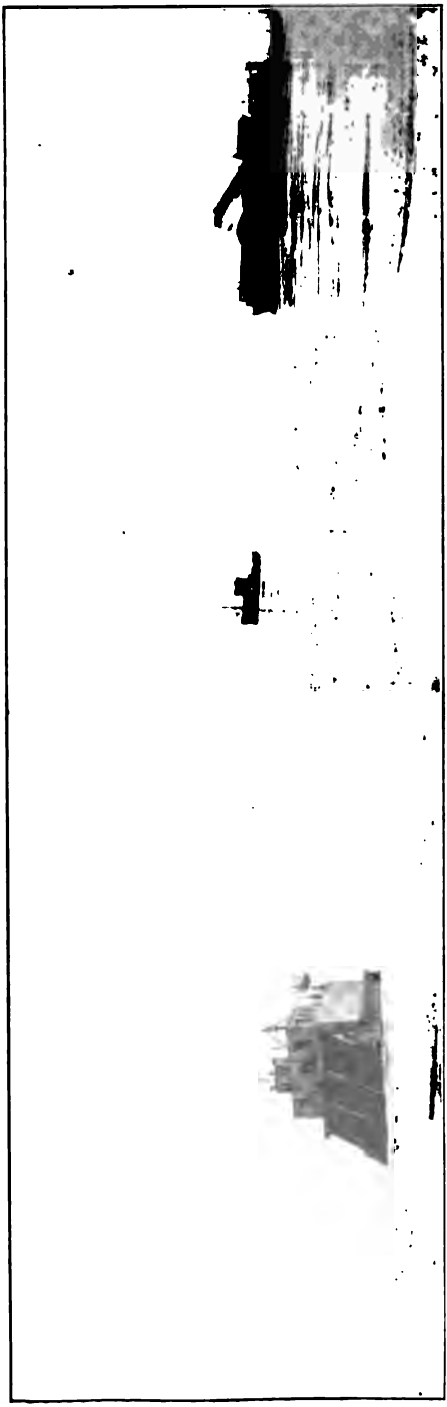


Fig. 38. Kelp cutter at work off Point Loma. Diamond Match Company's cutter and barge at work off Point Fermin. Photographs by H. B. Nidever.

Acknowledgments.

In the fulfillment of its duties the commission has had the help and cooperation of many different organizations. The United States Forest Service has greatly assisted in the administration of the fish and game laws and in the accumulation of data on the life histories of the different species of fish and game. The annual reports by chief forest deputies have been particularly valuable in furnishing information on the status of fish and game in the national forests. The Forest Service is in a position to render invaluable aid to the Fish and Game Commission by helping in the enforcement of fish and game laws, in the ridding of the forests of predatory animals, as well as in the propagation of fish. As an example, some twelve years ago, Supervisor Geo. W. Naylor of Inyo, then a forest ranger, carried fourteen rainbow trout over the almost impassable, bleak heights of the Sierras from the San Joaquin side, delivering safely in a camp bucket thirteen of them, which were put into Rae Lakes. These fish were the progenitors of one of the most wonderful rainbow trout centers known, which will furnish the eggs so badly needed to meet the enormous demands of the great southern California hatchery now being completed five and one-half hours below on Oak Creek. The University of California and Leland Stanford Junior University have continuously put at our disposal collections and laboratory equipment, have directed investigations and have helped to solve many puzzling questions. Acknowledgment is also made of the assistance of the United States Bureau of Fisheries, the United States Biological Survey, and of the fish and game commissions of other states, particularly that of Nevada, which has generously donated large numbers of brook trout. All of the railroad companies of the state have generously furnished free and reduced rate transportation of fish, attendants and special employees.

Statistical Reports.

Statistical reports of the several departments, including a record of fish-planting operations and a statement of the revenues and expenditures, are to be found in the appendix.

DEPARTMENTAL AND DISTRICT REPORTS

REPORT OF DEPARTMENT OF FISH CULTURE.

The Honorable Board of Fish and Game Commissioners.

Gentlemen: We have the honor to herewith present a report from the Fishcultural Department, for the years beginning July 1, 1914, and ending June 30, 1916—the third report since being placed in charge of fish culture.

Reports from all parts of the state indicate the beneficial results that have followed the systematic stocking of public waters under the supervision of men skilled in handling the fish. Notwithstanding the heavy drain on the streams and lakes by the ever increasing number of anglers, trout have appreciably increased in most of the streams where proper conditions have prevailed.

The ever increasing numbers of automobiles have carried the anglers on their journeys to all the accessible fishing waters in greater numbers each season. We find that a great many anglers who a few years ago, before the advent of the automobile, only fished one or two days in the season, now make frequent excursions to their favorite fishing grounds and take from the streams many times the number of fish that they did years ago. The increasing number of anglers, also the ease with which they can now reach the streams and the increasing zest for outdoor pleasures, such as angling, will soon make greater demands on our hatcheries, and to meet this demand some of our hatcheries will have to be enlarged and improved and new stations established. The Department of Hatcheries must meet the augmented demand for fish until such time when our annual limit of output has been reached, then a limit to the number of fish that each angler can take each season must be made by the legislature, either by limiting the number of days each week that persons can fish, or by making a shorter open season. With the contemplated improvements in our hatchery work, the time for this added legislation has not arrived and we hope it may be deferred for a number of years. California can safely say that, with only a few exceptions, fishing in most all of the streams is as good is it ever was; but with the extremely heavy fishing of the last two or three years we must keep close watch to see that our streams are not over-fished.

Administration Changes.

The commission decided during the fall of 1915 to have the office of the Department of Fishculture moved from Sisson Hatchery to San Francisco. This move necessitated a reorganization of the department. E. W. Hunt, who has been superintendent of the Tahoe hatcheries for twenty-five years, was made Field Agent of the Department of Fishculture, with the detail work of the hatcheries and the car messenger service under his supervision. A. E. Culver was placed in charge of screen surveys and A. E. Doney in charge of fishway surveys. As the superintendent of hatcheries had retained his appointment as superintendent of the Sisson Station since the date of his appointment as superintendent of hatcheries in November, 1911, a change in the superintendency of the Sisson Hatchery was necessary. A civil service examination was held in January, 1916, and G. H. Lambson, who had been with the Bureau of Fisheries as superintendent in the car messenger service and superintendent of Baird Hatchery, successfully passed it and was appointed by the commission as Superintendent of the Sisson Hatchery.

Stocking Lakes in the Inaccessible Mountain Regions of the State.

In the high Sierras and in the western part of Siskiyou and Trinity counties are hundreds of lakes of various sizes that are now barren of fish life. These can all be stocked at a small expense to the state and a greater area of fishing ground added to the state's wealth of waters in which game fishes will thrive.

Other improvements can be made by transplanting insects and other items of food from other waters to the streams and lakes that are lacking an abundance of proper food for trout. This work should be taken up at once and carried on systematically until all the streams and lakes that are deficient in proper food for the trout are in condition.

Fish Propagation.

Eight hatcheries and six egg collecting stations have been operated to their full capacity during the last two seasons and it will be necessary to enlarge our present stations and establish new ones to meet the demand for trout fry as well as to do the salmon work properly.

Our hatcheries should all be equipped with enough troughs and rearing tanks to rear the fry to a fair size before shipping. The relative advantages of planting fry or fingerlings in our streams and lakes is a question that is being brought up continually and in which there is a great difference in opinion. In our judgment both systems have their advantages, depending on the size of the stream, altitude, amount of natural food, variety of the fish and the season of the year. By studying these conditions and using good judgment and care in the distribution of either fry or fingerlings good results can be obtained.

The best results are obtained in planting fry in the smaller tributary streams in spring and summer when there is an abundance of food provided naturally to support fry at that age. In southern California, in the lower altitudes, conditions appear to be somewhat different and a larger fish planted in the fall seems to do the best; but in the mountainous parts of southern California, spring planting has given excellent results.

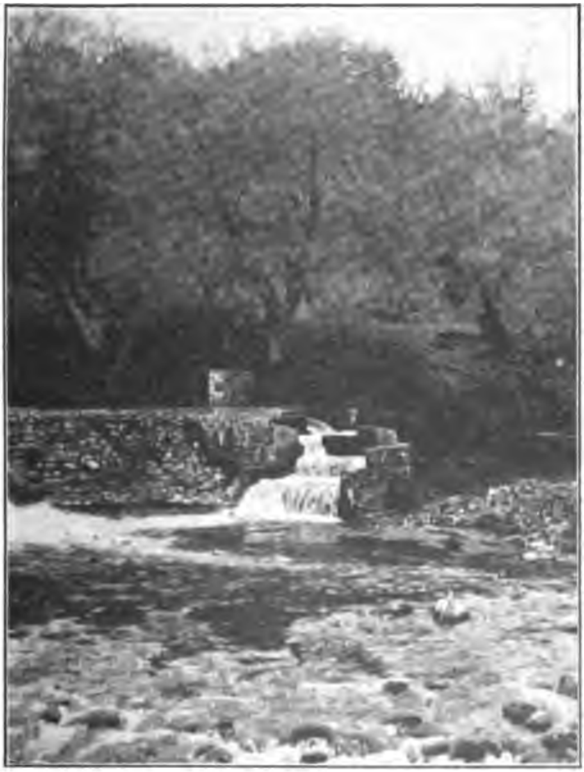


Fig. 39. Fish ladder constructed by Northern California Power Company on Butte Creek, Tehama County. Photograph by A. E. Culver.

The planting of fingerlings has an advantage over fry when the fish are planted in large streams or rivers where there are no spawning beds or natural feeding grounds for the fry, such as exist in the smaller streams. These places are not very numerous, as in most river systems suitable tributary streams can be found in which to deposit the fry, and as they develop they work slowly down the streams into the larger bodies of water, following their natural inclinations.

Some enthusiasts would have us rear the fish until they are almost large enough to catch, before planting. This would be beyond the finances of the commission to carry out, and furthermore a fish artificially fed too long is not a good rustler when liberated and is apt to suffer considerably before getting accustomed to natural conditions. Some of the best results have been obtained where fry from two to three months old have been planted. Absolute proof of this is at hand where new species have been introduced in the streams. Fry, if in perfect condition, free of bacterial disease, carefully reared by a skilled fishculturist and planted in the small tributary streams, are sure to give good results. We have been a close observer of these conditions for over thirty years in California and feel that we are pursuing the right policy in planting the majority of the fry from our hatcheries when they are from two to four months old.

A number of writers who are not fishculturists have advocated the building of ponds and nurseries along the banks of the different lakes and streams in the state to rear the fry until they are fingerlings before they are released into the streams. This might do in a few localities, but when we figure on rearing 16,000,000 or 18,000,000 of fry on thousands of miles of streams the proposition is impracticable, even if the state had money enough to build the ponds and to pay men to care for the fish. To turn the fry over to inexperienced persons, even where they go to the expense of building the ponds, is a poor policy and one in which the public as a rule will not benefit. The experience of fishculturists who are working for the public good must be considered in preference to enthusiasts and theorists. Fishculture is a well demonstrated practical proposition and the experience of men skilled in this work must be considered if the public is to get the benefit of the money invested.

Fishways and Screens.

The work of installing screens in the ditches and canals of this state and of constructing fishways over dams and obstructions has progressed entirely satisfactorily during the last two years. A. E. Culver as screen surveyor and A. E. Doney, fishway surveyor, have been untiring in their efforts to enforce the law and conserve the fish.

One hundred seventy-eight surveys of ladders over dams have been made. As a result of these surveys eighty-six obstructions have been removed or fishways installed in order that fish might have a free passageway.

Nearly six hundred screens have been ordered installed and 377 have been reported as completed. The wide extent of operations is indicated by the fact that screen surveys have been made in thirty-five different counties during the last two years.

Some new and difficult problems have presented themselves in both the screen and fishway work, but good progress has been made over the entire state, with the exception of the San Joaquin Valley, where some of the large canal owners are resisting our efforts to install screens in their canals. These owners object on the grounds that the screens are impractical and will impede the flow of water. This is a flimsy excuse, as experience has proved that the largest canals can be screened and the flow of water be undiminished, if they are properly cleaned. The parallel bar screen can be made to do good work and not cause any trouble under normal conditions. During extremely high water when floods prevail in the streams caused by melting snow or storms in the mountains carrying down an excess of floating matter, the screens can be removed for a short time to allow the debris to pass. When conditions are normal the screens can be replaced. It would be folly to say that the large canals can not be screened. If we can not have them screened all the time, we should make an effort to save as many fish as possible by keeping the screens in place when it can be done without damage to the flow of water in the canals.

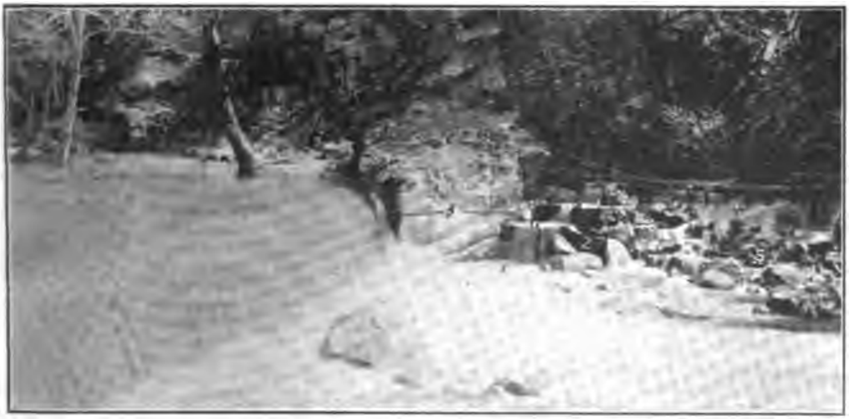


Fig. 40. Fishway at Bonally Dam, on the Salmon River, Siskiyou County. Photograph by I. Eldredge.

A screen is being installed in the Pacific Light and Power Company's canal at Borel in Kern County that works in sections on a revolving shaft. It can be cleaned at any time by turning a crank that turns the screen sections edgewise with the current and allows the debris to float down the stream. As soon as the debris is washed off, the screen is turned back in place. Some such device can be arranged if the parallel bar screens are considered too hard to clean. Any of the types of screens that we have recommended will work, if they are cleaned. We find that the trouble appears to be that some of the owners of the larger canals do not want to pay for the extra help required to clean the screens.

The commission plans to rigidly enforce the law regarding the screening of ditches and no excuses will be entertained. Taking it as a

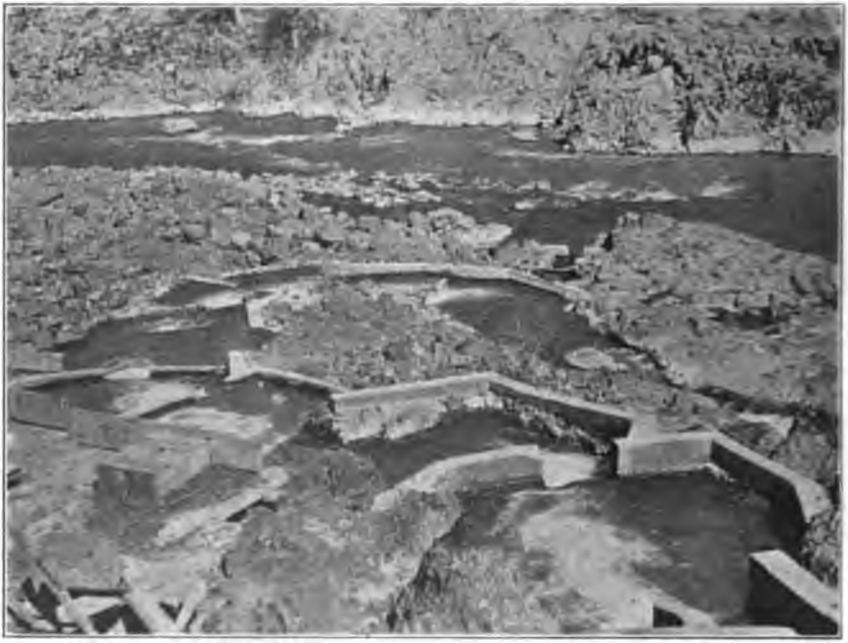


Fig. 41. Snow Mountain Dam Fishway, on south fork of Eel River, Mendocino County. Photograph by H. C. Bryant.

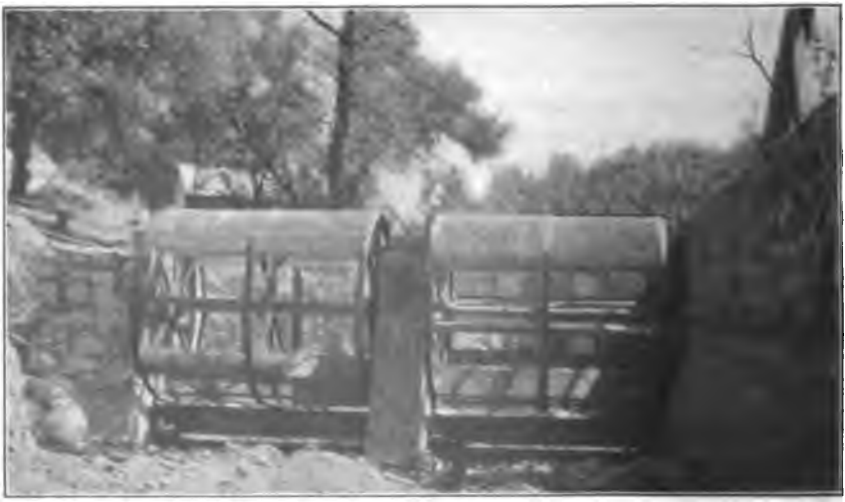


Fig. 42. Screen of Northern California Power Company at Inskips, Tehama County. Photograph by A. E. Culver.

whole, the screen work has been very successful, considering the number of ditches and canals that we have had to handle and the great difference in conditions that prevail in different parts of the state.

Pollution of Streams.

The pollution of the inland streams by sawdust, slimes from the mines, and other waste matter polluting the streams, has been given attention whenever reports have been received. We have not had any serious trouble with any of the cases handled, although numerous complaints regarding stream pollution by mining operations are received. Many reports come from the old mining districts where the fish were destroyed in the early history of mining operations in this state and no further damage can be done. Wherever new plants are reported we insist that all the slimes be impounded in storage reservoirs or vats until the heavier material has settled.

The flotation process of working ores has given us considerable trouble, as the pulp is so fine that it is very difficult to settle, remaining in suspension in the water for weeks. The damage that it does to the fish is very slight if the plants are not too large. We are giving this, one of the latest processes of handling ores, special study, for this method will probably be used extensively in nearly all mining operations in the future.

Propagation of Shad.

Early in the season of 1916 the question of propagating shad was taken up by the department. The heavy fishing for shad in the bays and in the Sacramento and San Joaquin rivers for the last few years had caused noticeable falling off in the numbers of these fish and to keep the supply up it was deemed necessary to resort to artificial propagation.

About the same time we received a request from the Massachusetts and Connecticut Fish and Game commissions requesting the California commission to collect shad eggs from California waters and ship them to their hatcheries, as they were desirous of restocking the depleted waters of the Eastern states with shad. Shad were introduced into California by the California Fish Commission in 1871. They increased rapidly until a few years ago the Sacramento and San Joaquin rivers were fairly alive with them in the spring and summer when the run of shad was at its height.

The excessive fishing and pollution of the Eastern rivers has caused the shad to become very scarce and it was the desire of the Massachusetts and Connecticut commissions to restock their waters. We agreed to collect the shad eggs for the two commissions, as it was considered an cpportune time to carry on experiments to locate the spawning places of shad as well as to make experiments to determine whether shad culture could be carried on successfully in California, and to determine whether the process of fertilizing the eggs and propagating the fry could be improved upon.

Consequently, the commission decided to operate a shad hatchery on a small scale during 1916 to carry out the experiments and to gather data in preparation for more extensive operations next season. When operations were begun in May, it was thought that all the eggs necessary for the shipments East, as well as for our experiments, could be collected by the latter part of May or early in June, but the season proved to be unfavorable and the work dragged along into July without sufficient eggs being obtained at one time to make a shipment East.

Fishing began on June 3d with our crews at Yuba City. The run was poor all through the season in the upper reaches of the rivers: nowhere near its size in former years. The light run of shad in the upper river was due to the very cold spring, cold water, and later to the high, roily water caused by the melting snow in the higher altitudes. During the season 1,421,000 shad eggs were collected and 872,000 fry hatched and successfully released in the Feather River. This work was under the immediate supervision of Superintendent G. H. Lambson of the Sisson Hatchery. Data regarding the movements of the shad that will be valuable in future shad work have been compiled as well as the results of the experiments in hatching the shad fry. The eggs were successfully hatched and the fry kept free from bacteria and fungus.

This coming season the shad work should be taken up in earnest and several million shad as well as striped bass should be hatched and distributed in the Sacramento River to keep up the supply of these valuable fish. Shorter seasons for catching these fish should be established by the legislature.

Sisson Hatchery.

Sisson Hatchery has been operated on the same general plan as in former years. The fry are held until they are from three to eight months old and are then shipped to all points in California where the local hatcheries can not supply the number and variety of fish desired.

As the result of a cooperative arrangement with the United States Bureau of Fisheries the commission received 34,300,000 quinnat and 1,900,000 silver salmon eggs in 1914–15 and 18,400,000 quinnat salmon eggs in 1915–16. These eggs were hatched and the fry carefully reared and fed until the majority of them were two to three months old; then they were distributed in the upper reaches of the Sacramento River and tributary streams near Sisson, and in the Klamath River. These fry were deposited in natural feeding grounds under conditions as nearly perfect as it was possible to find. Several million of the fry are held each season in the large ponds at Sisson Station, where they are carefully looked after and systematically fed until they are about eight months old; then they are distributed in the Klamath and Sacramento rivers early in the fall. A record of the numbers and place of distribution of these plants will be found in the statistical report of distribution from Sisson Hatchery.

During the fall of 1914, the commission decided to construct another hatchery building on the grounds of the Sisson Station to enable them to hold the fry so they could attain a better growth by giving them less crowding and more trough space. Accordingly, plans were made by the Department of Hatcheries, which the board approved. The plans called for a building 190 feet long and 42 feet wide, to contain 148 hatching troughs. As the expense of constructing this hatchery was over one thousand dollars, we had to have the work carried on under the supervision of the State Department of Engineering. This was to comply with a recently enacted law. To allow us to carry out our plans of constructing this building, W. F. McClure, State Engineer, kindly appointed the superintendent of hatcheries a deputy state engineer to construct the building. The work was rushed and the building completed in time to receive part of the salmon eggs from the Bureau of Fisheries' stations during the latter part of the hatch of salmon eggs for the season of 1914 (see Fig. 44).

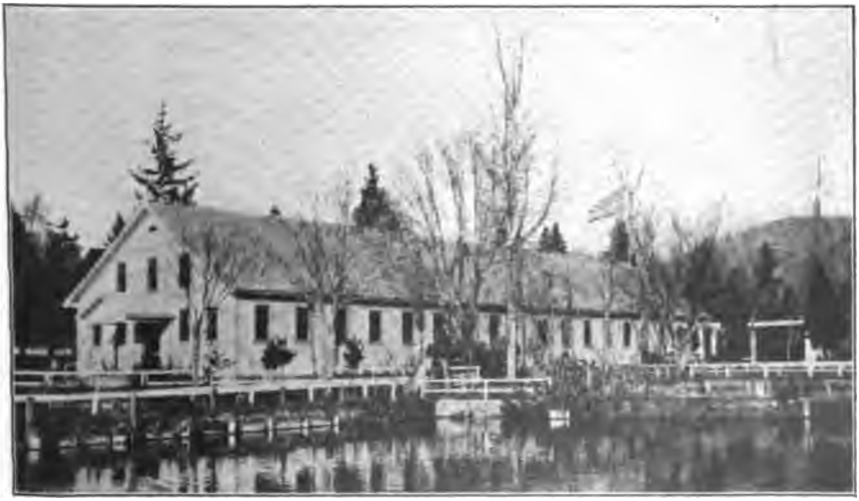


Fig. 43. Hatchery "A" at Sisson. Photograph by G. R. Field.

With its five hatchery buildings and auxiliary battery, containing in all over 500 troughs, and its 52 breeding ponds, the Sisson Station must be considered one of the largest hatcheries in the world. The station now has a capacity of fifty million trout and salmon fry per season.

One new pond was rented from Mr. Rupp, during the winter of 1915–16. The lease on the large pond, known as Sisson Lake, expired in the fall of 1915 and we were not able to have it renewed, so Mr. Rupp, who owns one of the large ponds leased by the commission for salmon culture, agreed to construct another pond and lease it to the commission for the rearing of fish. The pond was completed early last winter and stocked with salmon, where they are thriving. These fish will be distributed during the fall of 1916. We would respectfully recommend that the commission take measures to purchase these leased ponds or acquire more land near Sisson Hatchery to construct large ponds such as these, of one acre or more in area, for the rearing of salmon fry. The more experience we have in rearing salmon fry in ponds, the more we are convinced that the best results in salmon culture are to be obtained by rearing several million fry each season on the upper reaches of the Sacramento River where the water is pure and cold and where the fry can be liberated in the fall out of the reach of the predatory fishes that infest the Sacramento River after it enters the valley proper.

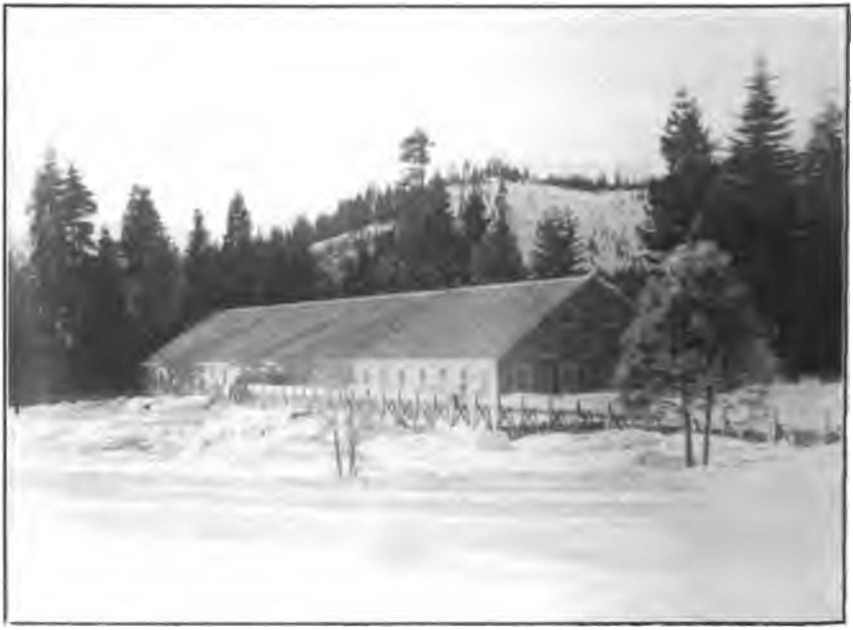


Fig. 44. Hatchery "E" at Sisson Station, completed January 1, 1915. This is the fifth large hatchery building erected at Sisson.

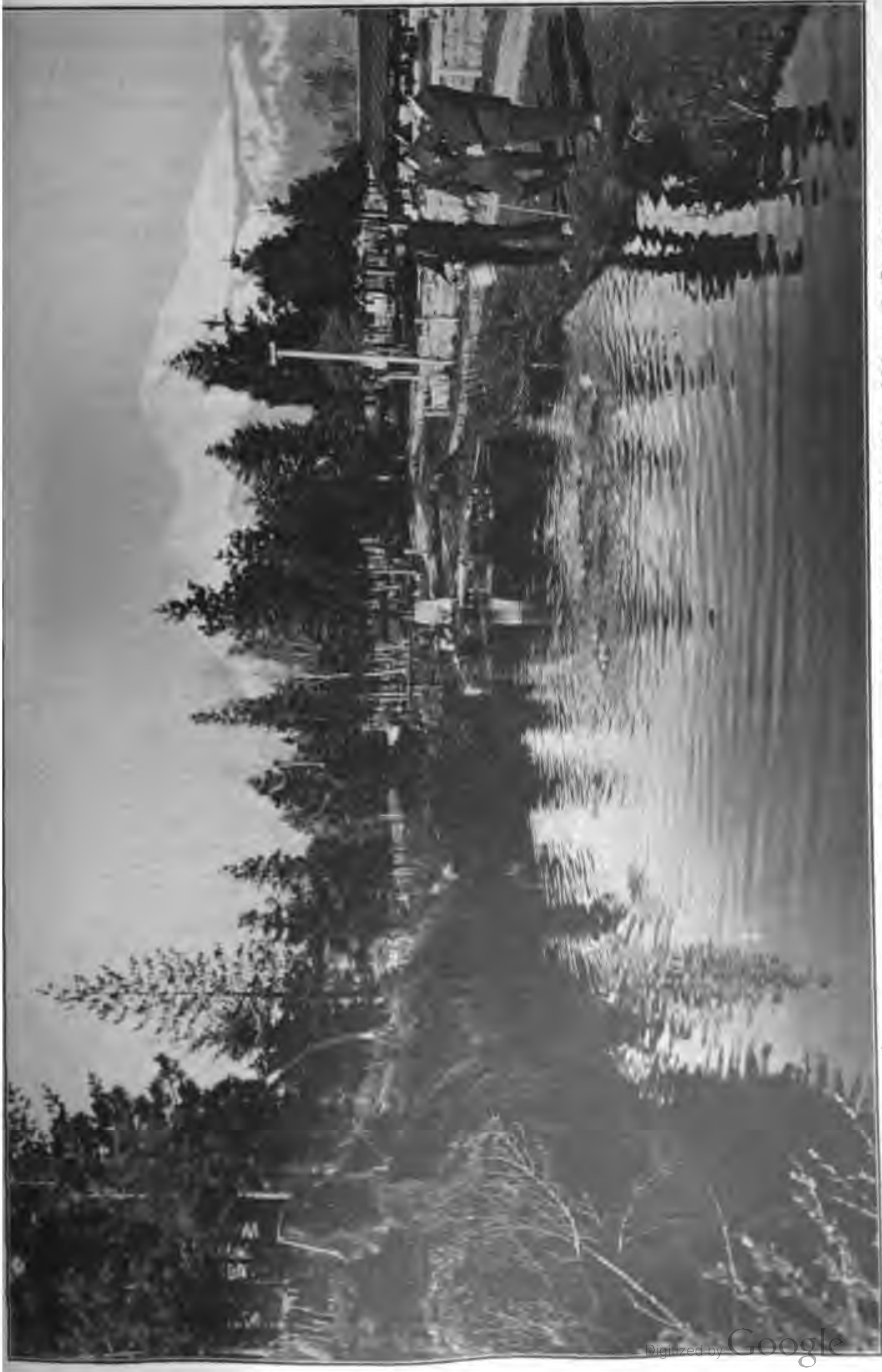


Fig. 45. Feeding fish in one of the ponds at Sisson Station. Photograph by Union Lithograph Company.

The increased number of trout fry hatched at Sisson Station during the season of 1915, 11,372,000, caused the Hatchery Department to design a more extensive plan of distribution. Accordingly, it was decided to operate two distribution cars. Arrangements were made with the Southern Pacific Company to rent a baggage car and have it equipped with a gasoline engine and an aerating system. This car was equipped at the Southern Pacific Company shops in Sacramento and put into the service July 1, 1915 (see Fig. 20). During the distribution season of 1916, two distribution cars were used from Sisson station.

The total number of fry distributed from Sisson Hatchery during the season of 1916 was 9,597,000, consisting of the following varieties: rainbow, eastern brook, Loch Leven, black-spotted, steelhead and German brown trout. There will be approximately 18,000,000 quinnat salmon distributed from Sisson Hatchery this season.

The pond system is being maintained and improved. We find that it is necessary to keep a good stock of brood fish in the ponds to give us a supply of eggs that we can always depend upon.

The number of fish on hand in the ponds at Sisson Hatchery July 1, 1916, was as follows:

	Adults	Two years old	One year old	Fry	Total
Trout—					
Rainbow	9,100	3,900	25,000	40,000	78,000
Eastern brook	8,600	10,000		60,000	78,600
Loch Leven	12,650	5,100	30,000	20,000	67,750
German brown				80,000	80,000
Steelhead			8,000		8,000
Dolly Varden	4				4
Miscellaneous—					
Landlocked salmon			450		450
Grayling	400				400
Total					313,204

Tahoe Hatcheries.

The Tahoe Hatcheries have been operated to their full capacity during the last two seasons. Mr. Hunt has had immediate supervision of these stations, as in former years. The output of fry will be shown in the statistical tables for these hatcheries.

We again respectfully recommend that the much needed improvements at Tahoe station be carried out in the near future. The Tahoe Hatchery should be enlarged so as to give it a larger trough capacity and Tallac Hatchery should be removed at the earliest possible date from Taylor Creek to Tallac Creek or to any other site where the water is suitable for rearing fish. The water in Taylor Creek is not fit for hatchery purposes. Taylor Creek rises in Fallen Leaf Lake and its water, during the warm weather, becomes impure from the organic matter in the lake. The fish become affected and it is necessary to plant them early in the season before they have made their proper growth. Negotiations are under way at present to acquire a new site on a nearby stream where the fry can be held until later in the fall, before distributing them. A battery of tanks is being planned in which to rear the fry to a much larger size than formerly, before planting them.

We repeat the recommendation made in the last biennial report regarding increased efforts to propagate the large lake trout (*Salmo tahoensis*), by trapping the upper Truckee River and Blackwood Creek for their eggs. This valuable fish should be increased in numbers by artificial propagation.

Fig. 46. Seining for striped bass to be transplanted to barren waters. Photographs by H. H. Hunt.

New varieties of game trout should be added to the native species of trout in Lake Tahoe, thus affording a fish for the angler as well as for the commercial fisherman. The Department of Fishculture is making arrangements to carry out these plans.

Considerable complaint has been made regarding the leeches affecting the trout in the streams entering into the lake, and the commission has been requested to remove the logs and brush from the creeks as the erroneous impression prevails that the logs are infested with the leeches and if the logs were removed the fish would not be affected. The common leech occurs in many fresh water streams and lakes and inhabits the gravel and rocks in the beds of the streams. It may be found on the logs and pieces of wood in the creeks, but only incidentally, as its native habitat is in the bottom of the streams among the gravel and rocks, and under the bank where it finds lodgment. It is parasitic on fishes, and if all the logs and wood in the streams entering Lake Tahoe were removed, the leeches would be present just the same. As soon as the fish enter the creeks from the deep water of the lake and come into the shallow water, the leeches attach themselves to the gills and mouths of the fish and in a short time the fish become greatly emaciated from loss of blood. When the leeches are gorged they drop off the fish and bury in the gravel at the bottom of the creeks. Where the leeches are numerous and a large number attach themselves to a trout the loss of blood is great and the fish often dies; but the number actually killed is not as great as some persons imagine. The trout are naturally weak during the spawning season and some of them perish from their efforts in spawning as well as from the leeches. The trout artificially spawned at the egg collecting stations escape many of the dangers incidental to spawning in the creeks, such as the ravages of leeches and the grab hooks and spears of poachers.

Brookdale Hatchery.

Brookdale Hatchery was operated during the seasons of 1915 and 1916 under a lease procured from Santa Cruz County. The eggs were collected at Swanton from Scott Creek. Under the conditions of the lease the county of Santa Cruz receives annually 500,000 steelhead trout fry to be distributed entirely in the public waters and the remainder of the eggs and fry are disposed of at the pleasure of the commission. The last two seasons' operations were productive of good results. In the season of 1915, there were 1,070,000 fry reared and distributed from Brookdale Hatchery and 2,287,000 eyed eggs were shipped to other stations to be reared and distributed in other sections of the state. There were 678,000 eyed eggs shipped from Brookdale Hatchery to Sisson Hatchery, and 877,000 fry distributed in the waters of Santa Clara, Santa Cruz and Monterey counties during the season of 1916. The distribution of fry from Brookdale Hatchery during the season of 1915 will be found in the statistical table of this report (see appendix).

Ukiah Hatchery.

Ukiah Hatchery was run as usual during the seasons of 1915 and 1916. Steelhead eggs were shipped to this station from the Snow Mountain egg collecting station. The fry were given a wide distribution in Sonoma and Mendocino counties. During the season of 1916, while removing the Price Creek Hatchery to its new location on Fort Seward Creek, 1,000,000 quinnat salmon eggs were hatched at Ukiah Hatchery for distribution in Mad and Eel rivers.

Fort Seward Hatchery.

Owing to the undesirable location of the Price Creek Hatchery, it was decided to remove it to a more favorable site. Price Creek Hatchery was located on Price Creek, one-half mile from its junction with Eel River. The creek has its source in the hills near the mouth of Eel River. The country through which it flows is a loose, friable and disorganized formation that is constantly sliding and washing away. During the winter months the creek was so full of sediment that it was only with the greatest skill and care that fish could be reared at all. In the spring the water dried up rapidly and became very warm so that it was impossible to hold the fry later than June. The commission decided to remove the hatchery to a more favorable location. The Department of Fish-culture was instructed to select a suitable site and to move the station. After a careful survey of the streams on the line of the Northwestern Pacific Railroad we selected Fort Seward Creek, a cold, clear stream flowing into Eel River about four and one-half miles above old Fort Seward, Humboldt County. The commission purchased forty acres of land near the mouth of the creek and selected a site for the hatchery about one-quarter of a mile from the Northwestern Pacific Railroad.

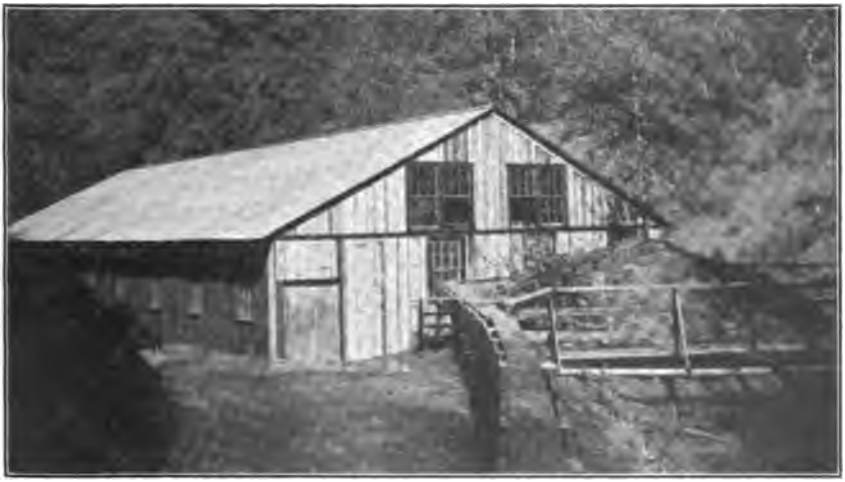


Fig. 47. New hatchery at Fort Seward, Humboldt County. Photograph by Silas Campbell.

Early in 1916, the work of moving the building, tanks, flumes, etc., from Price Creek to the new site on Fort Seward Creek was begun, and in due time it was completed and ready for the spring hatch of trout eggs (see Fig. 47). W. O. Fassett, who has been superintendent of the Price Creek Hatchery for a number of years past, was placed in charge of the new station and he has successfully carried on the work as in former years. A cottage for the superintendent and a cabin for the men was erected and finished in a rough way until more comfortable quarters could be arranged.

The building and troughs were ready for the steelhead eggs collected at the Snow Mountain egg collecting station during the spring. One million steelhead eggs were shipped to the station and the resulting fry are to be distributed in the streams of Mendocino and Humboldt counties. Besides the steelhead eggs, 100,000 rainbow trout eggs from the Lake Almanor station and 140,000 black-spotted trout eggs from th

Tahoe hatcheries were shipped to the new station for distribution in the tributaries of Mad River and Eel River.

This hatchery can be used for salmon culture as well as for trout work. Plans are being made to construct a rack across Eel River for the purpose of collecting salmon eggs for the hatchery at Fort Seward Creek. This will enable us to stock Eel River, Mad River, Elk River and several large streams on the Humboldt County coast with salmon fry. Formerly the salmon eggs for this section were shipped from the Sacramento River stations. If we are successful with this undertaking, an ample supply of eggs can be collected from Eel River without taking any from other hatcheries. Fort Seward Hatchery promises to be one of the most important stations of the commission.

Snow Mountain Station.

Early in the season of 1915, the commission secured a lease on the Cape Horn Dam from the Snow Mountain Water and Power Company for one year with the option of an additional five years. This lease gives the commission the use of the grounds and buildings as well as the privilege of constructing tanks, traps, etc., on the land described in the lease. Snow Mountain Station is one of the best steelhead egg collecting stations on the coast. The dam that makes it possible to collect the fish is located on the south fork of Eel River about twenty-five miles from Ukiah, Mendocino County. All the steelhead trout that ascend this branch of Eel River are easily trapped in the fishway over the dam. Last spring a series of tanks were arranged to hold the fish near the hatchery building. This tank system was arranged under the supervision of F. A. Shebley, a skilled fishculturist, who has made the work of holding large fish a specialty. The tanks and traps are so arranged that a portion of the mature steelhead trout are allowed to ascend the river above the dam to deposit their spawn and thus keep up the supply of fish in the extreme upper reaches of the streams tributary to this branch of Eel River.

Considerable complaint has been made by local residents regarding our operations at Snow Mountain Station. The claim has been made that not enough fish were allowed to pass the dam to keep the upper reaches of the river stocked. A hearing was held at Upper Lake, Lake County, on April 2d, by representatives of the commission. The meeting was well attended, about sixty persons being present. It was decided, after the hearing, to arrange a flume from a point near the tank house, where all the fish not needed for spawning purposes could be separated from the ripe fish and allowed to pass above the trap so they could ascend the river to the spawning grounds on the upper reaches of the river. This will be of considerable benefit if the fish are allowed to ascend the stream unmolested. There are a great many of these fish taken by the local residents before they arrive at the spawning grounds, in spite of the vigilance of the deputies. The idea prevails among some of these people that these large trout are salmon and that they will die as soon as they spawn. The steelhead is a true trout and not a salmon and will spawn several times if not taken or killed. A sufficient number of these fish will be allowed to ascend the river above the dam each season to keep the upper part of the river stocked by natural spawning.

Wawona Hatchery.

Wawona Hatchery has not been operated for the last two seasons, and fish were shipped from Sisson to supply the region covered by this hatchery. The station was operated during the season of 1914, and the distribution of black-spotted and large lake trout fry in the counties of Mariposa and Madera will be found in the statistical report (see appendix). This region will be supplied from the Inyo Hatchery next season, and we would, therefore, recommend that the Wawona Hatchery be abandoned.

Bear Valley Hatchery.

During the fall of 1914, San Bernardino County established a small hatchery on one of the tributary streams flowing into Bear Valley Lake. The object of this hatchery was to propagate rainbow trout from the fish in Bear Valley Lake. Bear Valley Lake, locally known as Big Bear Lake, is a body of water seven miles long and one and a half miles wide at its widest part. It is an artificial storage lake lying in the heart of the San Bernardino mountains about thirty miles from San Bernardino at an elevation of about 7000 feet.

This lake was stocked a number of years ago with rainbow fry from Sisson Hatchery and these fish have thrived remarkably well. The commission operated this hatchery during the seasons of 1915 and 1916. The first operations resulted in an output of 413,000 fry, all of which were planted in Big Bear Lake and in the streams of San Bernardino County.

Our crew of spawn-takers arrived at Big Bear Lake on March 16, 1916, prepared to exceed last season's take of eggs. Torrential rains during the winter had caused the mouths of the creeks to be filled with debris, which caused the fish to be delayed in entering the streams and the female trout became overripe before the first fish were spawned. Consequently the percentage of fertilization was not as good as expected. The rising surface of the lake, caused by the dam being raised, made a change in the shore line and the mouths of the creeks being closed in the beginning of the season by detritus carried down by the winter storms, embarrassed the operations to a considerable extent. Our men had to remove the sand bars and other debris that had been deposited at the mouths of the creeks, before the fish could enter. The fish being retarded, the eggs were affected by over-retention, and a high percentage of fertilization could not be obtained. The eggs that were fertilized hatched well and produced a lot of strong, healthy fry. The result of the season's operations was 750,000 fry, which are being distributed in Big Bear Lake and the streams of San Bernardino County. The county game warden, Mr. Malone, will assist in the work of distribution. In the table of distribution will be found the list of waters stocked with trout fry from this station during the season of 1915.

It is planned to get everything in readiness this coming fall so that there will not be any delay this coming season in collecting the eggs from Big Bear Lake. This will prove to be a valuable egg collecting station, as it will supply the streams of San Bernardino County that are situated far from the railroad in the heart of the San Bernardino mountain range.

Almanor Hatchery.

In an effort to increase the take of rainbow trout eggs during 1916, plans were made to establish an egg collecting station at Lake Almanor, Plumas County. The take of rainbow eggs at the Bogus and Camp Creek stations, on the Klamath River, was light, as this proved to be an off season on the Klamath. The run of fish in the tributaries of the Klamath River is very irregular, as our records for twenty-five years past will show. Whenever weather conditions are not propitious the fish do not run regularly and straggle along for months. Consequently the take of eggs is always light during such seasons. Early in 1916 we were satisfied that the take of eggs at these stations would be light, so we planned accordingly to make an effort to collect eggs elsewhere. Having heard that there was a considerable number of rainbow trout each spring in the North Fork of the Feather River at the outlet to Lake Almanor, Mr. Hunt, our Field Agent, was instructed to investigate and report on the chances of collecting eggs at this place. He reported the condition was favorable for a good take of eggs.

We secured permission from the Great Western Power Company to operate on their property at the Lake Almanor Dam. The company also kindly gave us the use of their buildings in which to establish a temporary hatchery. The crew worked under difficulties. The snow was deep and it was difficult to get the supplies and equipment to the station; but in spite of the difficulties, we collected 1,635,000 eggs and successfully held them until they were ready for shipment. Fort Seward Hatchery received 100,000 eggs, 240,000 were shipped to Tahoe Hatchery, 840,000 to Sisson Hatchery, 100,000 to the Nevada State

Fish Commission, and the remainder were hatched and distributed in the local streams and in Lake Almanor.

Reports were received that a good run of rainbow trout ascended Rice Creek, a tributary of the North Fork of the Feather River above Lake Almanor. After making an examination of the stream and gathering data from the local residents we have decided to establish an egg station there this fall, so as to have it ready for next spring's work.

We have located a site for a small hatchery and egg station at Domingo Springs. Domingo Springs is on the main road leading from Chester to Red Bluff, and is one-half mile from Rice Creek Falls, where we have selected a site for a trap and retaining tanks for our egg collecting station. The water from Domingo Springs gushes from the lava rocks at the foot of a cliff near the road. There is about 300 inches of water in the springs, an ample supply for a fair-sized hatchery, should it ever be necessary to operate one in that section on a large scale. We have a permit from the United States Forestry Department for the hatchery site at Domingo Springs, as well as for the trap and tank site on Rice Creek.

Next season we will operate a trap in Rice Creek to determine the number of eggs that can be collected and if our efforts are successful we will make this a permanent egg collecting station and establish a small hatchery at Domingo Springs to supply the district west and north from Lake Almanor, as well as to keep up the supply of trout in the lake.

Burney Creek Station.

In the spring of 1915 we secured a lease on a piece of land at the mouth of Burney Creek, a tributary of Pit River, Shasta County, for the purpose of collecting rainbow trout eggs. A rack was placed across the stream and the necessary live cars and pens were made to hold the fish that we expected would enter the creek. A tent and a few troughs under it, with our hatching equipment, was set up and operations were begun with the intention of collecting and eyeing eggs preparatory to shipment to Sisson.

It was originally planned to eye the eggs and hatch them in the old Hat Creek Hatchery, seven miles from Burney Creek, if a sufficient number were taken; but early in May an eruption of Mount Lassen sent a tremendous flood of mud, water and sand down the Hat Creek Valley, destroying all the fish in the stream from its source to its confluence with the Pit River. This was one of the most serious destructions of fish life in recent years in California. Hat Creek rises in the southeastern part of Shasta County in a lake at the foot of Mount Lassen, at an altitude of 7300 feet above sea level. It flows northerly into the Pit River, two miles northwest of Carbon, where the old Hat Creek Hatchery was located. It is thirty-eight miles in length. Its principal tributary is Rising River, a short stream arising from large springs in the lava. It is only two miles in length, but has an average flow of 380 second feet of water. Hat Creek, before its confluence with Rising River at the town of Cassell, has an average flow of about 100 second feet during the summer months. Hat Creek and its tributary, Rising River, were noted for the excellence of their rainbow trout. After the flood of mud and sand from Mount Lassen, the only survivors in the valley were those that were in Rising River. The water was muddy all during the season of 1915 and during the last year continued so muddy that it was not considered practical to restock the stream. It will probably be several years before fish will again thrive in Hat Creek, as the shifting sand deposited by the volcano destroys all the insect life in the stream, as well as making it uninhabitable for trout.

The fish enter Burney Creek late in the summer, but the run is a protracted one, lasting from April to August. The fish are late in developing and if the fry were reared in a higher altitude and the progeny spawned later each season, a fall spawning rainbow trout could be developed. This would probably have some advantages over a spring spawning fish, as such trout would be in fine condition for the anglers when the fishing season opens in the spring.

The eggs collected during the season were eyed at Burney Creek Station, and 200,000 were shipped to Sisson Hatchery, from which station they were distributed to different sections of the state. Owing to heavy operations at other stations, Burney Creek was not operated during the season of 1916.

A Southern California Hatchery.

During the summer of 1915 the commission again took up the matter of constructing a hatchery for southern California. A hatchery for southern California has been advocated for several years, but to find a location where the water, climatic conditions and transportation facilities were suitable for a hatchery large enough to supply the region south of the Tehachapi and the country lying to the east of the San Joaquin Valley, was not easy. The hatchery department had made investigations and gathered data on the best streams in the country south of the Tehachapi, but none of them was found to meet all the requirements necessary for the proposed hatchery. Some of the sites were inaccessible, others too far from railroad transportation, but the great majority of them, although located where the water was pure and in sufficient quantity, were undesirable because the water was used for domestic purposes. In October, 1915, Commissioner M. J. Connell notified the Department of Hatcheries that he had found an ideal stream of water on which to locate a hatchery such as the board had been looking for. He called our attention to Oak Creek, Inyo County, and ordered the Superintendent of Hatcheries to make a report on the stream.

Oak Creek was found to be the largest and most important stream that enters the Owens River Valley in the region of Independence. The reason for selecting the region near Independence was to enable the commission to secure an ample supply of eggs near the hatchery. Mr. Connell had found that a series of lakes, situated in the high Sierra region west of Independence, were teeming with rainbow trout of an excellent quality and from which millions of eggs could be procured. These lakes are in a glacial basin and are known as the Rae Lakes.

Oak Creek enters the valley about five miles north of the town of Independence. It has an abundance of pure, cold water. The maximum flow (which is in June) varies from 20 second-feet to 200 second-feet, depending on the depth of the snow that falls on the upper reaches of the stream, and the rapidity with which it melts during the first warm spell in the early summer. The average minimum flow for the last six years was 8 second-feet, and this late in the fall. This stream will supply a hatchery station with a capacity of from 10,000,000 to 12,000,000 fry. As the largest number of fish are handled during the maximum flow, this creek supplies almost an unlimited flow of water for hatchery purposes. The source of Oak Creek is in the precipitous range of mountains on the west side of the valley at an altitude of about 10,000 feet. Its descent is very rapid until it reaches the floor of the valley. From its source on Diamond Peak and Black Mountain, the main stream, or the North Fork, is 8 miles long to its junction with the South Fork, which rises on the southeastern slope of Black Mountain and is also about 8 miles in length. The South Fork falls from its highest source to its junction with the North Fork 7100 feet in a distance of 8 miles. The North Fork falls 8700 feet in its course from the source to its junction. The confluence of the two forks of Oak Creek is about 1½ miles from the base of the range in the Owens River Valley. The land slopes gently toward the plain on a gradient of about 4 per cent.

About one-quarter of a mile below the junction of the two forks of the stream, the commission secured forty acres of land on which to establish a hatchery. On this site a large hatchery is now being erected. The building now under construction is 192½ by 45 feet, constructed of natural stone, gabro and granite, found on the floor of the valley (see

Fig. 31). The building will contain offices, storerooms and a laboratory on the lower floor and living quarters for the help in the upper story of the structure. It will be equipped with up-to-date plumbing. All the troughs will have a separate water supply. The aerating system will be on the latest and most modern lines. The waste pipes, catch basins and drains will all be of cement. The arrangement of the whole system when completed is expected to be the latest and most improved in fishcultural work.

The supply of eggs will be procured from the Rae Lakes—a system of lakes lying in the heart of the Sierras at an elevation of 10,500 feet above sea level (see Figs. 48 and 49). These lakes were stocked by a party of enterprising citizens from Owens River Valley, under the leadership of Geo. W. Naylor of Independence, former sheriff of Inyo County and now a member of the board of supervisors. The fish were taken from Charlotte Lake and transplanted to the waters of Rae Lakes sixteen years ago. The original stock came from Kings River and were transplanted into Charlotte Lake. A recommendation will be made to the next legislature to set aside the Rae Lakes as a fish preserve for the purpose of protecting the brood fish for their eggs. This is necessary to supply the large new hatchery with an ample supply of eggs.

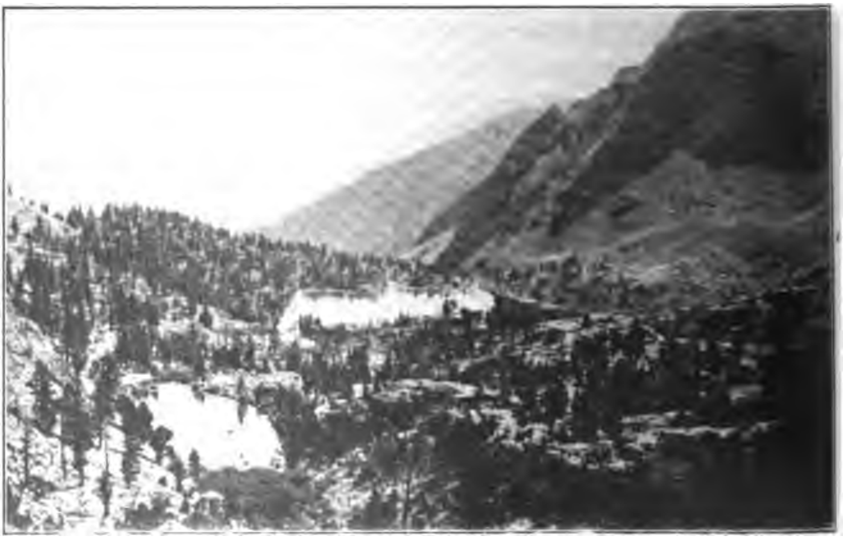


Fig. 48. Lower Rae Lakes. Photograph by J. C. Von Blon, August 17, 1916.

Distribution from the hatchery now being constructed on Oak Creek can be made to all points in southern California as far north as Merced and from there to the Yosemite Valley, easier and better than from any other point where hatcheries can be operated. It will take fourteen hours from Owenyo, the point on the railroad where the fish cars will be loaded, to Los Angeles, and about seventeen hours to Merced. This will allow of the planting of the fry in the shortest possible time from any of the large hatcheries in California. This site can not be excelled for many reasons: first, there is a great amount of pure water in Oak Creek; second, the climatic conditions and altitude for the rearing of fry are ideal; third, a large number of spawn fish can be taken from the Rae Lakes and transferred to the hatchery; fourth, the hatchery is centrally located, where all southern California and the mountain district adjacent to the San Joaquin Valley, including the Yosemite National Park, as well as the region north to Mono and Alpine counties, and the hundreds of barren lakes in the southern high Sierras, can be kept stocked with less expense than under any other system of hatchery work.

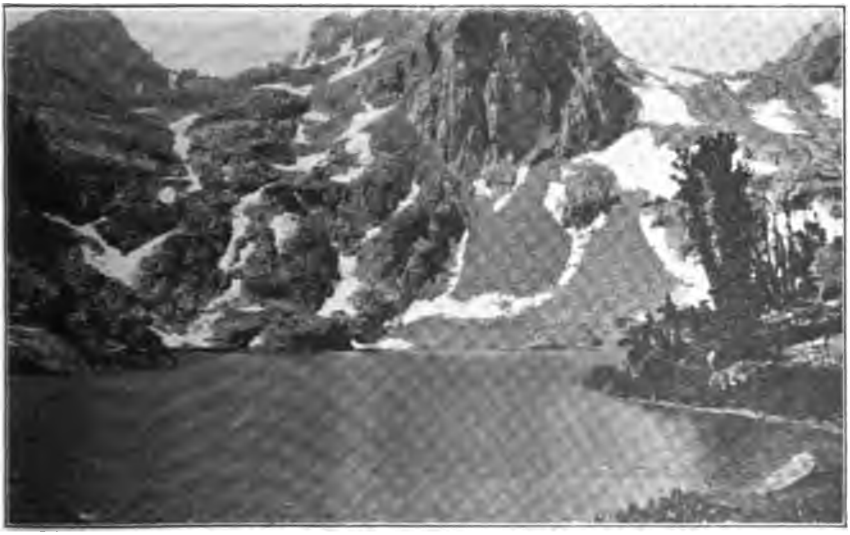


Fig. 49. A near view of one of the Rae Lakes where trout eggs are to be obtained for the Inyo Hatchery. Photograph by R. D. Duke, August 17, 1916.

Acknowledgments.

The commission acknowledges its appreciation and gratitude to the following railway and transportation companies:

The Southern Pacific Railroad Company, Western Pacific Railway Company, Northwestern Pacific Railroad Company, Santa Fe Railway Company, Nevada-California-Oregon Railroad Company, Lake Tahoe Railway and Transportation Company, Ocean Shore Railroad Company, Sierra Railway Company, California Western Railroad and

Navigation Company, Amador Central Railroad, McCloud River Railroad Company, Yreka Railroad Company, Oakland, Antioch and Eastern Railway Company, Northern Electric Railway Company, San Joaquin and Eastern Railroad, Visalia Electric Railroad, Yosemite Valley Railroad and Virginia and Truckee Railroad, for the free transportation of the employees of the hatchery department in care of the eggs and fish, and for the free transportation of our distribution cars. Without their assistance our work would be restricted very materially.

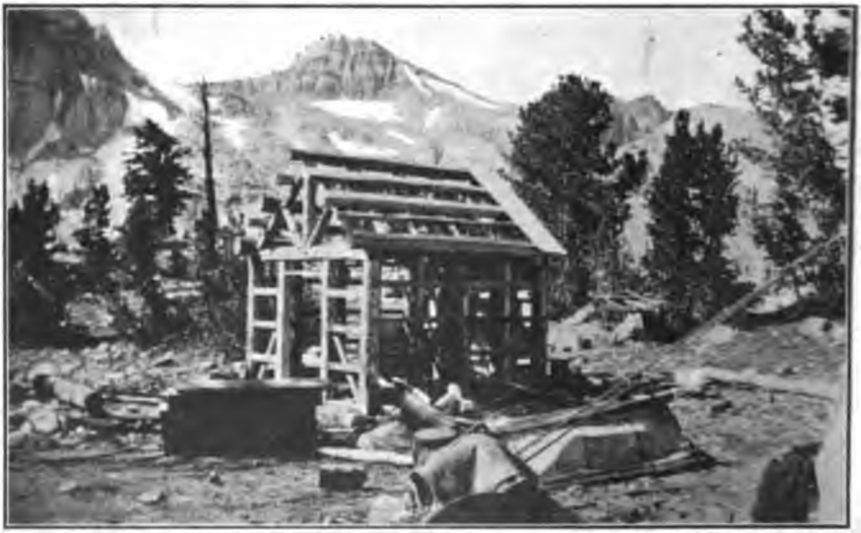


Fig. 50. New egg collecting station at Rae Lakes, showing the type of structure that must be erected to withstand the heavy snows at elevations above 10,000 feet. Photograph by F. H. Shebley.

Recommendations.

The most important recommendation that we desire to make is one in regard to dams in rivers inhabited by migratory fish, particularly salmon. We would recommend that a law be passed the same as the proposed federal law for the territory of Alaska. A law should be passed providing that any person or corporation desiring to construct a dam or obstruction in any stream in which migratory fish exist to a height that will make a fishway thereover impracticable, in the opinion of the Fish and Game Commission of the state of California, shall secure a site and erect thereon a hatchery, dwellings for the help, traps for taking the fish and all equipment necessary to operate a hatchery station according to the plans furnished by the Fish and Game Commission, and to convey the same to the commission when completed. If a site is not available or the water not suitable at or near the dam, the owners or occupants of such dam shall erect a hatchery and equip the same at any point below the dam that the Fish and Game Commission may select for the purpose of propagating the eggs from the fish that are obstructed in their ascent of the river by the dam or obstruction.

This concludes our report. A great many other recommendations could be made regarding the changes in the fishway law, trout seasons, salmon laws, etc., but we will make these recommendations in a separate report on that subject.

We wish to express our appreciation and thanks to your honorable board for the support that you have given us and those associated with us in this work. The earnest support of our superiors and the efforts of our assistants have made the last two seasons work the most successful of any in the history of the commission.

Respectfully submitted.

W. H. SHEBLEY,
In Charge, Department of Fishculture.

REPORT OF DEPARTMENT OF COMMERCIAL FISHERIES.

The Honorable Board of Fish and Game Commissioners.

GENTLEMEN: The recent rapid growth of our fisheries has made it necessary to obtain more detailed and accurate knowledge of our fishery resources than has yet been attempted, if they are to be intelligently conserved. The development of the tuna, sardine and kelp industries has done much to awaken public interest, and there is a demand that some study be made of the albacore (tuna) and that the effect of cutting the kelp for potash be investigated. In order to more efficiently handle the problems arising and to meet the necessity of obtaining a better knowledge of our fisheries, the Department of Commercial Fisheries was formed early in the year 1915.

Before this department was permanently formed the fishing methods employed in the different fisheries and the methods of canning and curing were studied. The more important fisheries were rather hurriedly investigated during the year preceding the last legislative session that the commission might be better able to aid in the enactment of laws governing the fisheries. Some very good and important legislation was the direct result of this study, chief of which was: a redivision of the state into fish and game districts to fit the need of the commercial fisheries; a closed season and regulations for salmon and steelhead fishing on Eel River that would do much to conserve both the salmon and steelhead and at the same time fairly well satisfy the two opposing factions, the sportsmen and commercial fishermen; a better season for Mad and Smith rivers; a closing of the Sacramento River to nets above Vina and the protection of the summer run and part of the spring run of salmon in the district from Colusa to Vina; the closure of many streams and sloughs that were not capable of sustaining net fishing; the abolition of the paranzella net in southern California, a net which nearly ruined the southern halibut supply; the reestablishment of the trammel net in southern California that it might take the place of the paranzella net without destroying the young fish as did the paranzella; the establishment of a uniform and just minimum mesh for salmon and striped bass on San Francisco Bay and the rivers; a uniform catfish law for the Sacramento and San Joaquin rivers; and a law requiring fish handlers and dealers to report the quantities and kinds of fish handled each month.

Since the formation of this department we have considered it of first importance to gather accurate and detailed information concerning the present commercial fisheries of the state, with the ultimate object of building up these industries and at the same time conserving the marine species upon which these industries depend, and to investigate and aid in the development of our latent and undeveloped fishery resources.

We are recording the results of our work in the form of permanent notes, which are filed in such form that they will become the property of the state and can be referred to readily and be used by anyone who may wish to continue the work. Much valuable information has been lost in the past because it was not filed. We plan, as soon as we have sufficient data on any one fishery, to put the information in the form of reports accompanied by illustrations, so that it can be published. We have published reports on the tuna, shad and paranzella fisheries and are prepared to publish reports on the salmon, sardine, striped bass, rock cod, crab, catfish and abalone fisheries.

Fig. 51. Rock cod fishermen at Fishermen's Wharf, San Francisco. Photographs by A. M. Fairfield.

A law enacted by the last legislature requires dealers and handlers of fish to make an accurate monthly statement of the quantity and varieties of fish handled and where they were caught. We have considered it of the greatest importance that this law be enforced and that the reports be complete and accurate. To that end a list of all the dealers of the state required to make this report was compiled and printed blanks issued to each. The law went into effect in August, 1915, and we have been able to get a very complete and accurate record of the fish handled since the 1st of October, 1915. This record, if kept up, will show the decline or rise of any fishery and the season of each variety of fish. This, supplemented by the number of boats, men, nets and the intensity of the fishing, which we are obtaining, will give us the basis upon which all conservation measures must rest. We are publishing the statistics as we gather them in the quarterly bulletin, CALIFORNIA FISH AND GAME, along with other contributions on subjects of interest concerning the fisheries.

We have investigated, as far as we could, the fish marketing problems; the sanitary or unsanitary handling of fish by fishermen, by markets and in shipment; the cold storaging of salmon, the utilization of fish waste for fertilizer or for chicken feed. We have, since the first of the year 1916, been gathering data regarding the prices paid the fishermen and the prices paid by the retailer and consumer for the different varieties of fish in representative towns in the state. Since the appointment of the State Market Director we have given him the results of our work and have cooperated with and aided him in every possible way. Practically all of the recent data on California fisheries which are available are the result of the work of this department of the Fish and Game Commission. Now that he has taken up the fish marketing problem, we will be relieved of much of that part of the work, as it more properly belongs to him. We will probably continue, at his request, to aid in certain lines where our facilities for obtaining information are better than his.

We have been appointed a member of the Northern California Fish Exchange Committee as organized by the State Market Director. This exchange consists of five members, the fishermen, the wholesalers, the retailers, the State Market Commission and the Fish and Game Commission each being represented by a member on the committee. The last two named members are to represent the people of the state. The object is to unite the producer, the dealer and the people for their mutual benefit and fix each day the maximum price the consumer shall pay. Under the arrangement a certain per cent will be collected from the business for advertising, by which means it is expected to induce the people to use fish every day of the week and thus increase consumption, lessen the cost to the consumer and help develop our fisheries.

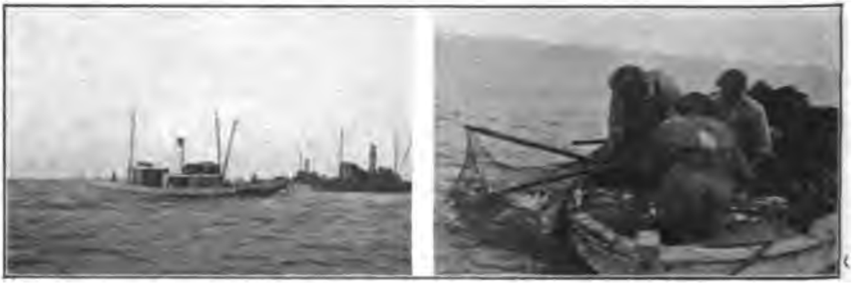


Fig. 52. Sole and sand-dab steam trawlers working out of San Francisco and a Santa Cruz gasoline trawler hauling in catch. Photographs by H. B. Nidever.

The working rules of the Fish Exchange Committee provide for the adjustment of differences or disputes between the fisherman, wholesaler, retailer or the public. They provide the first good opportunity the fishermen have had of presenting their side of the case and decisions reached by the committee should have great weight with the legislature. It will be the particular duty of the representative of the Fish and Game Commission to represent the fish themselves; in other words, to see that our fishery resources are conserved.

A survey of the economically important shellfish of the state, begun several years ago, has been taken up and completed under the direction of Dr. Harold Heath of Leland Stanford Junior University. A full report is in preparation. In connection with this work, Pismo clams were transplanted to several suitable beaches in San Luis Obispo County and an extensive plant of eastern softshell clams made in Morro Bay, which appears to be especially well suited to them. A report of this work was published at the time in CALIFORNIA FISH AND GAME.

In 1911 and 1912, under the direction of Dr. C. H. Gilbert of Leland Stanford Junior University, the Fish and Game Commission liberated large numbers of marked quinnat salmon fry in the Sacramento River, Scott's Creek and San Lorenzo River. This was the most comprehensive fish marking experiment ever undertaken. More than 200,000 marked salmon fry were liberated and it was expected that many important facts regarding the life of the salmon would be learned from these experiments. The fish resulting from the first fry liberated were in their fourth year in 1914, at which time they were expected to appear in Monterey Bay and in the streams where they were liberated. In order that we might recover as many as possible of these fish we distributed circulars to all handlers of fish on Monterey Bay and to all handlers of fish from San Francisco Bay and rivers. These circulars contained a diagram of a salmon to illustrate the different marks and full directions as to how to take samples of scales and make a record of each fish. The commission's deputies at Monterey, Santa Cruz, San Francisco, Sacramento and on the bay and river patrol boats assisted in the recovering of these fish. The fish dealers were much interested and gave every assistance. We personally visited nearly every one of these people to explain the importance of recovering these fish. We had envelopes printed and distributed which could contain a sample of scales from each and the record of each as to size, sex, kind of mark, etc. The number recovered was disappointing.

In the year 1915, partly because we were better prepared to carry on the work, the number recovered was considerably larger. By placing a rack across the San Lorenzo River we were able to get a good record of the marked fish entering that stream. A few fish were taken in Monterey Bay in 1916, but not many were expected as they are now in their sixth year. As yet the material and records obtained have not been studied further than to determine that the method employed in ascertaining the age of salmon from the scales is accurate. While the total number of fish recovered was disappointing the material and data collected is very valuable, and when properly studied and reported upon, will be a most valuable contribution to our knowledge of the quinnat salmon.

DEVELOPMENT OF CALIFORNIA FISHERIES.

In the following we give the important developments in our fisheries:

The Long-finned Tuna or Albacore.

Since our report on this industry in the last biennial report of the Fish and Game Commission the fishery has continued to grow until it now more than doubles in value and importance either the salmon or sardine industry.

In 1914 the tuna pack was 325,000 cases of one-pound and half-pound cans. The pack for 1915 was 360,286 cases, of which there were 136,046 cases of one-pound cans, 172,263 cases of half-pound cans, and 51,977 cases of quarter-pound cans, with 48 cans to the case. For this pack there was required 23,500,000 pounds of round fish, and the wholesale value of the pack was $2,300,000. Besides the tuna that were canned more than two million pounds were dried, smoked, salted and used fresh.

During 1915 twelve tuna canneries were in operation in southern California and in 1916 the number has been increased to sixteen, which during the season give employment to 1800 people. The amount invested in buildings and equipment is $910,000. About 400 fishing boats valued at $1,000,000 are employed, and the number of tuna fishermen is 1200.

The remarkable feature of the season of 1915 was the large take of tuna in November. The demand for canned tuna is now so great that it exceeds the supply and the prices obtained are high. Most of the canneries have been enlarged in anticipation of a larger catch, but unless a good catch is made late in the year, as happened last season, the pack is likely to be less for 1916. The tuna packers are anxious to have the migration and life history of the albacore investigated. They would like to know how much fishing the albacore will stand and what measures, if any, will be needed to conserve the industry. We have no conservation measures to propose, for the albacore that appear in our waters are mostly mature and are here in search of food. Any important conservation measures that may be needed would have to be applied in Mexican waters, for it is there they spawn and it is there the young are found. The industry in this state will adjust itself to the number of fish that come this far north, but the tuna packers would naturally like to know beforehand how much the fish will stand, that they may regulate their industry accordingly. So far no serious attempt has been made to can the albacore in Lower California. It is believed that albacore may be taken throughout the year near Cape San Lucas, Lower California. If this is true and a large canning industry should be built

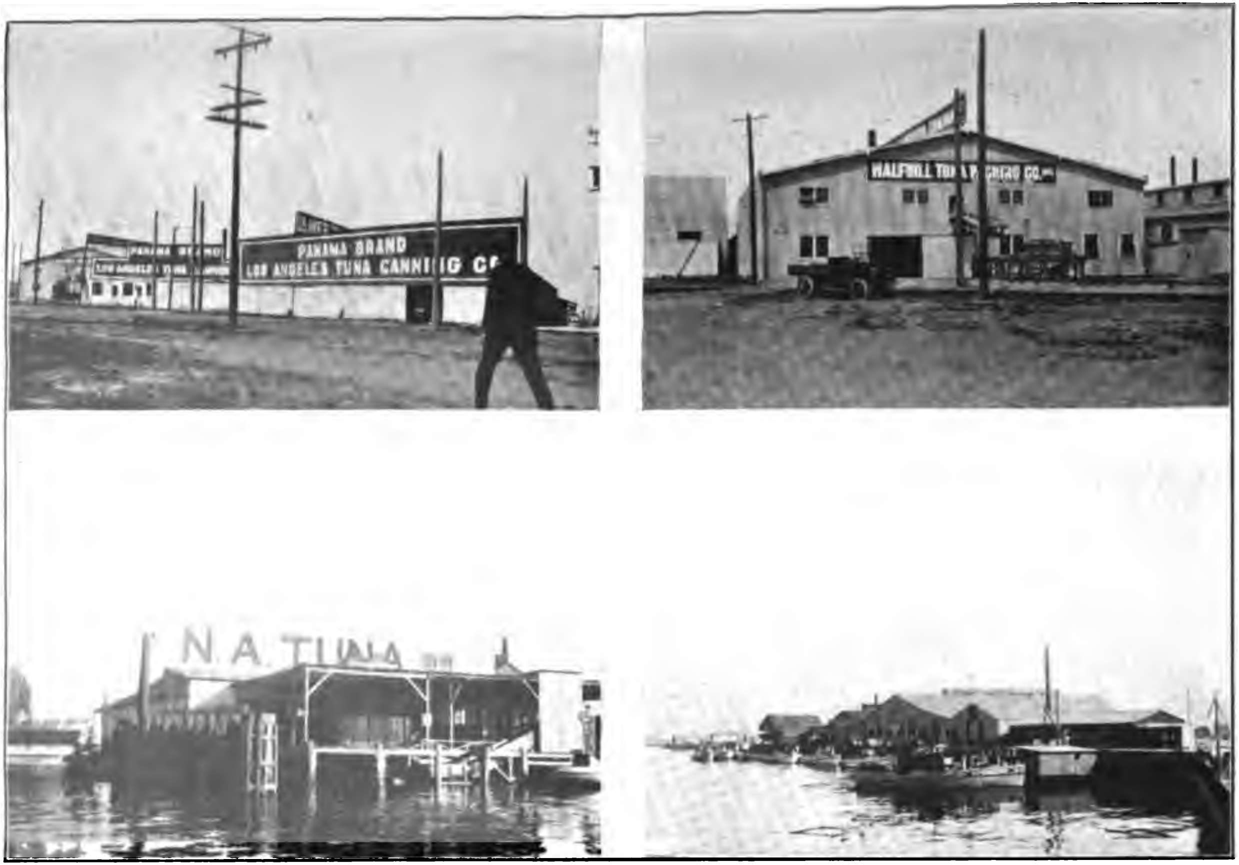


Fig. 53. Tuna canneries of Los Angeles Tuna Canning Company, Long Beach; Halfhill Tuna Packing Company, Long Beach; North American Tuna Canning Company, Terminal Island; and Stafford and Crandall and Tweedale companies at Wilmington. Photographs by H. B. Nidever.

up at that point, it would probably seriously affect the supply of fish in this state.

The difficulty of securing live sardines and anchovies for bait is still the serious problem that it was when we last reported. Attempts have been made to use large purse nets to capture the albacore and thus get along without bait, but the expense of operating the nets has been so great and the catch so small that the method has been abandoned. Large circle nets have been successfully used in Japan for these fish, but it is doubtful if they will ever be a success here as our fish seldom appear in compact schools.

Fig. 54. Tuna fishermen's boats at San Diego. Photograph by H. B. Nidever.

Salmon.

Only two species of salmon are taken commercially in California, the quinnat or chinook and the silver or coho. A few individual dog and humpback salmon are occasionally found entering our small streams. The silver salmon enters nearly every stream of any size from Monterey Bay north, with the exception of the Sacramento River, but is not taken in any quantities except in the Eel, Klamath and Smith rivers. The quinnat or chinook is the principal salmon of Monterey Bay and the Sacramento, Eel, Mad, Klamath and Smith rivers.

SALMON CATCH FOR THE YEAR 1915.

Monterey Bay (chinook)	3,045,446 pounds.
San Francisco Bay and lower rivers	4,374,932 pounds.
Sacramento River above Colusa	172,389 pounds.
Total	7,592,767 pounds.

This amount was utilized as follows:

450,000	pounds canned.
2,742,400	pounds mild cured.
750,000	pounds hard salted.
3,650,367	pounds used fresh.

At Fort Bragg, Mendocino County, 56,247 pounds of chinook salmon were taken by trolling in the open sea and shipped to San Francisco. The combined catch on the Eel, Mad, Klamath and Smith rivers was: 1,649,189 pounds chinook and 286,719 pounds silver salmon. Of this amount, 1,063,189 pounds were canned, 840,908 pounds were used fresh and 32,000 pounds were mild cured.

The total catch for the state was 9,298,203 pounds chinook and 286,719 pounds of silver salmon. In addition to this there were taken in Eel and Mad rivers, 33,204 pounds of steelhead, which were marketed fresh.

The 1916 salmon catch for the six months ending June 30th was:

Monterey and Santa Cruz	3,848,073 pounds.
San Francisco Bay and lower rivers	983,979 pounds.
Sacramento River above Colusa	149,080 pounds.

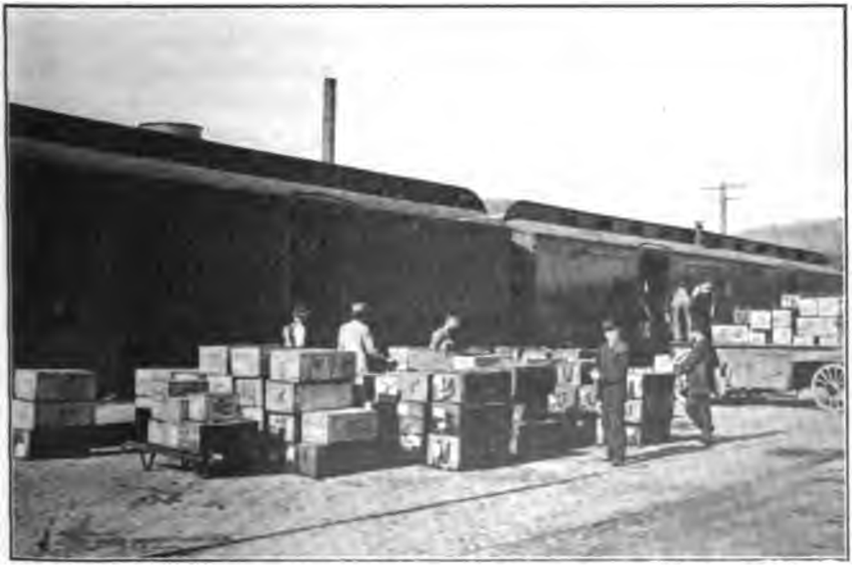


Fig. 55. Loading 150 boxes of fish, principally salmon, at Monterey. Photograph by A. M. Fairfield.

The salmon of the Sacramento River are apparently holding their own, if we include the salmon taken in Monterey Bay and outside the Golden Gate, as it is proper to do. While our figures for the catch of Sacramento salmon for 1915–1916 are not up to the estimates of former years, they are undoubtedly nearer the actual average yearly catch, as figures in the past have been principally estimates with the usual tendency to avoid underestimating the catch. The fall run on the Sacramento has been less than the average for the past few years on account of the greatly increased catch outside and in Monterey Bay.

A few years ago a half-million pounds was a good catch on Monterey Bay. In 1914 the catch was two and one-half million pounds. In 1915 it jumped to three million pounds and up to June 30, 1916, the catch for Monterey Bay and outside "The Heads" exceeded four million pounds. In 1916 the greatest catches in Monterey Bay were made in May. About 400 boats were engaged in trolling and the record day's catch for all boats was 85 tons. This year the run was followed up the coast by the fishermen. Early in August the boats were making good catches near Davenport, above Santa Cruz, and in a few days they were just south of the Golden Gate. For nearly three weeks the salmon remained outside, part of the time north and part of the time south of the entrance. Nearly one hundred boats trolled for the fish while they were off the Golden Gate. On one day over 50 tons were taken. Many small salmon were taken during this run outside San Francisco Bay, a large number being less than five pounds in weight. Such a run of small fish was never observed here before.

The spring run of salmon on the Sacramento River has been poor for the past seven or eight years. Several reasons have been advanced for this: That no protection of a closed season is given the spring run as is given the fall run; that the seines in the upper river have taken the spring fish principally and have allowed very few to pass to the spawning beds; and that little attention is given to the artificial propagation of the spring run. These theories are all based on the supposition that the two runs are practically distinct and that spring run salmon make spring run salmon and fall run salmon make fall run salmon. As a matter of fact, the actual relationship of the two runs has never been demonstrated. It is the belief of fishculturists, however, that the fish resulting from the eggs laid down by either the spring or fall fish are more apt to return as fall fish. Theoretically the progeny of the spring run fish have a better opportunity to survive and pass out of the river to the sea as good sized fry than have the progeny of the fall run fish.

For the purpose of giving the spring fish a better chance to reach the spawning grounds in the upper waters of the river, a law was passed at the last session of the legislature which prohibits netting in the river above Vina and provides a closed season for the district from Vina to Colusa from May 15th to the end of the year. It was hoped that as a result of this measure, the one hatchery that operates on the spring run —the federal hatchery on the McCloud River—would be able to take a large number of eggs, but unfortunately they failed to operate the hatchery this spring; nor did they operate last year for the spring run. We are informed by our deputies that a much larger number of salmon ascended McCloud River this summer than last year, which indicates that this upper river salmon protective measure has had the desired result and that the natural hatch will be increased thereby even if the artificial hatch is not.

Shad.

Only a few years ago the shad was so plentiful as to be almost a nuisance, but now it is being overfished and protective measures will be necessary to prevent serious injury to the supply. The Chinese shrimp fishermen, when they were compelled to discontinue shrimp fishing in 1911, prepared to salt shad for the markets of China. They began operations in the spring of 1912. The next year saw some of our larger fish handlers in the business. Figures are lacking for the first years, but in 1915, 2,400,000 pounds were dry salted; besides this, 100,000 pounds of fresh shad roe were used locally and shipped East and 606,048 pounds were canned in half-pound cans. About 350,000 pounds of the fish were used fresh within the state and 360,000 pounds of round fish were canned, making a total of 3,816,048 pounds for the year. On account of the increased water freight rates no shad were dry salted for the Chinese trade this year, but the increased demand for canned shad and for our fresh shad in the eastern United States resulted in a larger catch. Thirty-three carloads of the fresh fish were shipped East, as well as twenty casks of mild cured shad, for which there is an Eastern demand developing. There were used in the fresh markets of the state up to June 30, 1916, 405,992 pounds out of a total of 4,413,675 pounds taken. A great many more were canned than in 1915.

In spite of the fact that the catch is rapidly increasing from year to year, the supply of fish is decreasing. It is estimated that the number of shad entering the river in 1915 was 40 per cent short of the year before and that the run of 1916 was 60 per cent short of the 1915 run. In fishing for shad, gill nets with a 6½-inch stretched mesh are used. This size mesh catches the roe shad only and allows the undesirable buck shad to pass through. The fishing which was formerly almost entirely in the river is now mostly in the lower bays, San Pablo Bay especially. The nets used on the flats of San Pablo Bay have, in addition to shad, been catching large numbers of striped bass which come in preparatory to ascending the river to spawn.

In 1915 accurate account was kept of the proportion of male to female shad on the upper San Joaquin River. The males outnumbered the females 20 to 1. This year the proportion is stated to be near 40 to 1 and the total number of shad appearing in the upper river is decreasing very rapidly. This difference in number between the sexes shows the intensity of the fishing. The sexes normally are about even and if the males exceed the females 40 to 1 in the upper river it means the 6½-inch mesh gill nets have captured 97½ per cent of the roe shad. As the corresponding 97½ per cent of males is useless as far as the propagation of the race is concerned, it is evident that only 2½ per cent of the run is left to continue the species, when 50 per cent would be nearer the right number. We will have one more year of this overfishing before any protective measure can take effect, and in the meantime, the shad run is likely to be nearly ruined. We very much need a law similar to that of other states which gives to the fish and game commission and to the governor of the state the authority to make regulations in cases of emergency of this sort.

Halibut.

The California halibut (*Paralichthys californicus*) has become one of our most important food fishes and the annual catch by California fishermen exceeds 5,000,000 pounds. It is found from San Francisco south, being most numerous south of Point Concepcion and in the Mexican waters of Lower California. Unlike the northern halibut, which it resembles in appearance, it inhabits the shallow water along shore and the majority of the fish marketed do not exceed 20 pounds in weight, although individuals weighing from 50 to 60 pounds are occasionally taken.

The principal methods of capture have been by trammel or three meshed nets set on the bottom and by the drag nets known also as paranzellas or trawls. The drag nets, used as they are, near shore, have proved themselves to be very destructive to the young halibut. For one ton of marketable halibut caught by this method, three tons of the young halibut too small to market were destroyed, for very few of them could be returned to the water alive. When the loss is figured in numbers instead of weight we find that more than 50 young were destroyed in capturing one of marketable size. To remedy this condition the use or possession of paranzella or trawl nets was prohibited in southern California at the last session of the legislature, and the use of the trammel net restored which, until that time, through some mistaken notion, was prohibited within one mile of shore—the only territory where they could be used. In addition to abolishing the drag net, our present law prescribes an 8-inch minimum mesh limit for trammel nets and a four pound minimum sale limit for halibut, so that this fishery is much better protected than it has ever been. It is doubtful, however, if it has protection enough, for the halibut grows slowly and has not reproduced at the minimum weight of four pounds as set by law. The intensity of the fishing for this species is bound to increase and if at any time our fishermen are excluded from Mexican waters, overfishing in our waters will be sure to take place. It may be necessary, if we are to conserve this fishery, to protect a portion of the fish of reproductive size by increasing the minimum mesh limit of the nets or by closing small areas to fishing. The halibut is another of our fishes that needs to be thoroughly investigated.

The amount of halibut taken by California fishermen between October 1, 1915, and June 30, 1916, was 3,951,690 pounds. Of this amount 1,668,814 pounds were taken in Mexican waters.

Crabs.

Crabs taken at San Francisco during the open season 1914–1915 (November 15th to July 30th) amounted to 49,716 dozens; for the corresponding season of 1915–1916, 40,370 dozens. Crabs taken in Monterey Bay during season 1915–1916 amounted to 15,037 dozens and those taken in Del Norte and Humboldt counties during the same season, 5,114 dozens.

Crabs, we believe, are adequately protected by the present law, under which the marketing or possession of female crabs or the marketing or possession of any male crab under seven inches in width is prohibited and a closed season is provided from July 31st to November 14th. With this protection there can be no serious depletion of the crabs, for a sufficient amount of breeding stock is preserved and the fishing, no matter how intense, can not go beyond the limit of the natural annual increase of these crustaceans. The San Francisco fishery seems to have reached this limit and toward the end of the season the fishermen are not able to find enough legal crabs to supply the market. During the closed season that follows, the crabs cast their shells and increase their size about one-fourth, so that on the opening of the season on November 15th the legal sized male crabs are plentiful again.

The crab fishery in Monterey Bay has had a remarkable development. Only two or three years ago there were so few crabs in that bay that it did not pay to fish for them. During the last open season, as will be seen from the figures above, over 15,000 dozens were taken. In contrast to this is the crab fishery of Humboldt County which produced less than one-third this amount. The reason for this is not the scarcity of crabs, but the fact that there is a county ordinance prohibiting the shipment of crabs out of Humboldt County. As already stated, our present state laws adequately protect the crabs, and to prohibit shipment from the county gives the crabs more protection than they need and prevents the development of a valuable industry. Under this restriction the crabs are extremely abundant and of large size, one-fourth of those caught running over eight inches in width. The fishermen instead of getting $2.00 per dozen, as do the San Francisco fishermen, get less than $1.00 per dozen. It is estimated that this fishery could supply annually at least 30,000 dozen crabs, for which the fishermen would receive $60,000, if they were given access to outside markets, instead of less than $5,000 as at present.

Shrimp.

Shrimp fishing by means of Chinese nets was resumed in 1915 in District No. 13, set off for the shrimp fishermen in the south end of San Francisco Bay. The use of Chinese shrimp nets was prohibited by law in 1911 at which time the annual catch of shrimp was near ten million pounds. Of this amount a little less than one million pounds was used in the markets of the state, the remaining 90 per cent being dried and shipped to China. In the four years following the enactment of this law no other successful method of catching shrimp was devised and most of the time shrimps were not to be found in the markets. In redividing the state into fish and game districts it was possible to set aside the south end of San Francisco Bay for the use of the Chinese nets, where it had been shown that the number of young edible fish destroyed by them was not large in comparison with the former destruction in other parts of the bay. Since the Chinese began operating last fall three or four boats have fished intermittently and the total catch is running about 350,000 pounds per year, which is but little over a third of what the markets took before fishing was stopped in 1911. The boats fish now only when the tides are most favorable and when the shrimps are plentiful. It does not pay them, they say, to fish when the catches are small. Formerly the profit was principally in the dried shrimps and the larger ones were screened out and sold fresh as a side issue. The price obtained now for the fresh shrimps is the same as then—6 and 7 cents per pound—although the operating cost is much greater on account of drying operations being cut off.

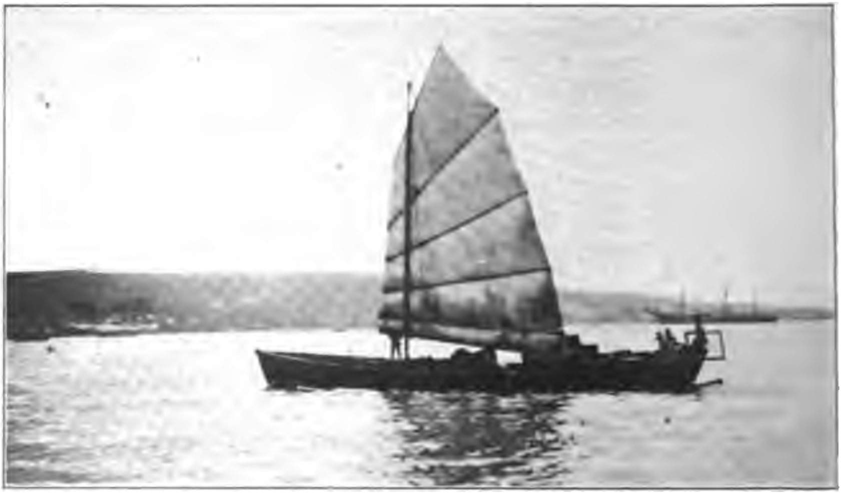


Fig. 56. Chinese shrimp fishing junk on San Francisco Bay. Photograph by H. B. Nidever.

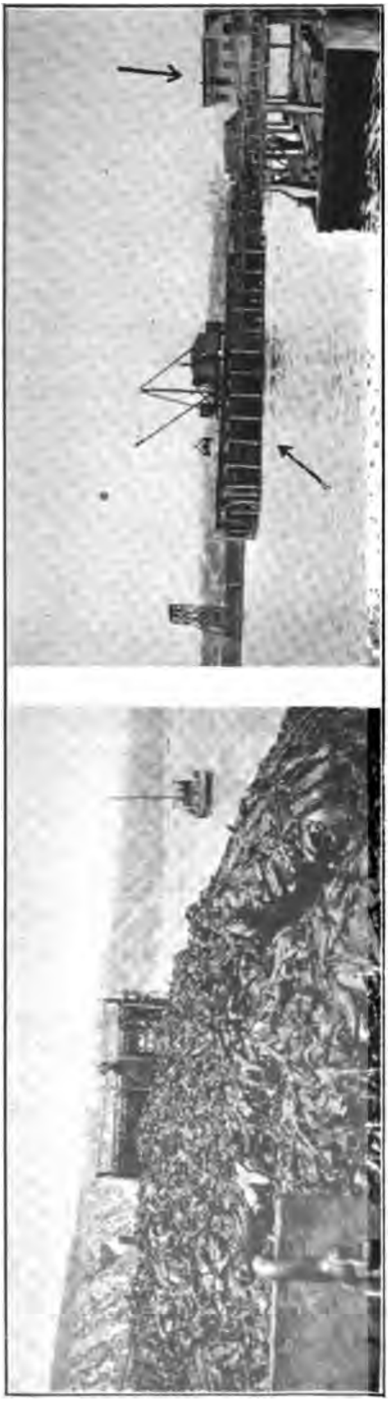


Fig. 57. Barge load of kelp ready for removal to reducing plant. Hopper for receiving kelp from cutter, plant of Swift and Company, San Diego. Photographs by H. B. Nidever.

Kelp.

The cutting of kelp along our coast for the potash contained therein is a new and very large industry which has sprung up within the last two years. The immense beds or groves of kelp are all within three miles of the shore and come under the jurisdiction of the state. At the 1914–1915 session of the legislature the State Fish and Game Commission was given the same supervision over the kelp and other marine plants that it has over the fish and game, so that it will be the duty of the Fish and Game Commission to enforce any state laws that may be passed for the regulation or conservation of the kelp industry.

It has long been known that the kelp along the Pacific coast contained a high percentage of potash. Considerable experimenting has been done to find methods of gathering the kelp and extracting the potash and other by-products that are commercially profitable.

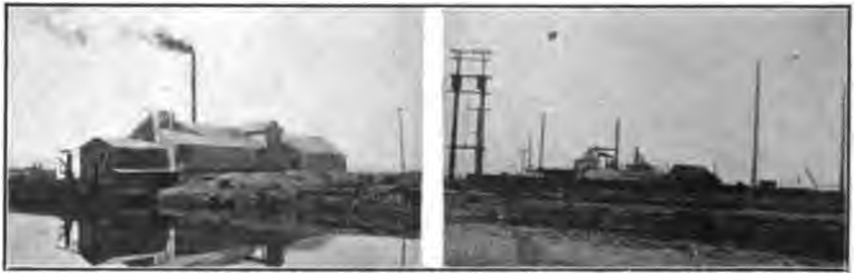


Fig. 58. A fish reduction plant for the manufacture of fertilizer, and a kelp reduction plant, at Long Beach. Photographs by H. B. Nidever.

The main source of our potash supply has been Germany, where deposits in what were ancient lakes or seas are found. The United States Department of Agriculture, realizing the importance of having a source of supply of our own and wishing to encourage the greater use of potash as a fertilizer to increase our crops, started an investigation of our kelp beds and conducted experiments in extracting the potash. The results of these investigations are to be found in Report No. 100 of the United States Department of Agriculture.

The beds of kelp which can be profitably harvested in California are all of them along the southern coast of the state, mostly south of Point Concepcion. Immense beds are also found along the peninsula of Lower California in Mexican waters.

The kelp is very largely composed of water and to profitably extract the potash large quantities will have to be handled. It requires a great outlay of capital for a company to embark in the enterprise. The high price of potash caused by the war has been such an inducement that several large companies have built plants at Long Beach and San Diego and are now beginning to harvest the kelp, confident that there is a sufficient supply, even though many may engage in the same industry.

At the present time there are four companies operating at San Diego, five at Long Beach and one near Wilmington. There are also several other factories being constructed at San Diego and Long Beach. Already three million dollars has been invested in the plants in southern California. Sixteen large reapers are employed, which have an average capacity of 200 tons each per day. The larger of the companies now operating are: The Hercules Powder Company, at National City; Swift Packing Company, San Diego; American Products Company, Long Beach; and The Diamond Match Company, at Wilmington.

There has been considerable uneasiness as to what effect the cutting of kelp will have on the fisheries of the state. Many fear that the cutting will destroy the beds and thus the protection which the kelp affords the beaches will be removed and that the clams which inhabit the beaches and the spiny lobsters which live more or less within the protection of the kelp will be greatly injured. Also that the young fish, especially the young barracuda, which are in the habit of seeking a refuge in the kelp, will be deprived of this refuge and will leave that part of the coast. It is also believed by many that the kelp beds are extensively used as spawning places for many of our commercial fish; that they attach their eggs to the kelp and that if the kelp is removed these eggs will be destroyed.

These beliefs are almost entirely groundless. Members of the Scripps Institution for Biological Research at La Jolla, employed by the government in its kelp investigations, are still engaged in watching the effect of cutting by the several large companies located there. It is their opinion that these companies are not likely, at least within the next several years, to devise kelp cutters or reapers which will cut the kelp more than six feet below the surface of the water. It has been observed that after one of these reapers has passed over a bed cutting the kelp to a depth of six feet that the kelp floats to the surface and it is difficult to even tell where the cutter has been. At the worst, there will be much of the kelp, especially along the edges of the beds, that will not be touched and which will afford protection to the beaches. It has been pointed out that where great masses of kelp grow in beds a violent storm detaches the plants from their holdfasts and the whole mass is carried away, thus leaving the beach unprotected. It is believed that where beds have been subjected to cutting that they will not be washed out by storms and will be a better protection to the beaches. Further, the kelp will still be a refuge for fish, even if it is cut six feet below the surface. It will also be a refuge for crawfish. Few or none of our commercial fishes spawn in the kelp beds.

The species of kelp which is being harvested in California is the *Macrocystis pyrifera,* which grows in long strands, from one to three hundred feet in length, and is held to the rocky bottom by means of a holdfast. The leaves float out on the surface of the water and are held suspended by floats specially designed for the purpose. The plants reproduce by spores, which lodge at the bottom, and start new plants, and also by stooling or sending off branches from the stock near the holdfast. If the top end of a plant is cut off, the rest of that particular stalk ceases to grow, but the shorter branches, which are continually arising from the base, soon grow up and take its place. Experiments are now being conducted at La Jolla for the purpose of determining the rate of growth of these plants and it is believed that the cutting of the kelp near the surface will tend to make them stool so that the growth will be increased by the cutting.

The companies engaged in the cutting of kelp are all large companies of proved business integrity and it is to their advantage not to destroy the kelp beds, but to conserve them and cut them only as fast as they will reproduce themselves.

It is the desire of the federal government that the state enact laws under which kelp beds may be leased or apportioned to operating companies and under such regulations that the beds will furnish continuous crops.

It was believed by those who investigated the California beds under the direction of the United States Department of Agriculture that there was enough kelp from Point Concepcion to the Mexican line to supply annually, without injury to the beds, all the potash used in the United States. The amount used annually before the great war cut off the supply from Germany was 300,000 tons, which, at antewar prices, was worth $15,000,000. The cutting has now progressed until a few of the beds have been cut over once and it has been determined that they are not producing the quantity estimated in the survey. This shortage may be as much as 50 per cent. It is believed that one reason of this is that since the survey was made storms have reduced the beds and they have not yet had time to reestablish themselves. The kelp harvesters or reapers that so far have been devised fail to pick up much of the kelp that is cut. This fault is overcome to a certain extent where one reaper follows the other and picks up what is left. There has been a good deal of complaint that the reapers cause large quantities of kelp to drift onto the beaches, where it smells badly and causes flies to accumulate. In most cases where an investigation was made, the kelp on the beaches was made up of the whole plants which had been torn from the bottom by the high tides and rough water. However, the whole kelp problem needs to be thoroughly investigated and in the meantime such regulatory laws as are obviously necessary should be passed.

OUR UNDEVELOPED FISHERY RESOURCES.

With few exceptions our sea fisheries have not been developed to their full capacity. By proper conservation they can be greatly extended. The fisheries can be more readily developed by educating the public in the use of fish and by improving the methods of handling, especially in inland towns. This work properly belongs to the State Commission Market, but we expect to assist by getting out educational bulletins containing descriptions of the different varieties of fish, how and where they are caught and when they are in season, with recipes for cooking. In other words, to develop the fisheries and reduce the cost of fish by creating a greater demand. This has been done in a few instances by private parties, as in the case of the California sardine and the albacore. There was no demand for either of these fish until they were placed before the public in a clean and appetizing form and the public educated to their use by advertising. Within a period of five years these two fish sprang from unimportance to a position of the highest rank. The albacore has assumed first place among our fisheries and the sardine is crowding the salmon for second place. What has been done with these two fish by private parties can in a measure be done with others with encouragement and assistance from the state. It is more properly the duty of the state to investigate and develop its fisheries than it is to investigate and develop its agricultural resources, for the fish are peculiarly the property of the people. We have several species of good food fish in almost unlimited numbers which are little used. A few of the important ones are the herring, anchovy, hake, shark and squid.

Fig. 59. Unloading and sorting abalones at Monterey. Photographs by H. B. Nidever.

Our shell fisheries are neglected and if properly conserved may be greatly extended. We have many extensive sand beaches where the Pismo and razor clams will flourish if they be but planted there. The soft-shell mud clam, originally introduced from the Atlantic coast, is suited to many bays and mud flats where it has not yet been introduced. On the Atlantic coast great advances have been made in "farming" the soft-shell clams and they are being raised on beds where they do not naturally establish themselves, by removing the young "spat" from beds where a good "set" has been made and sowing them like grain on these barren beds. The production of clams can be increased by this method almost without limit. As there is a most excellent market for these clams such an increase in production would be very desirable. In order to raise clams, or oysters for that matter, it is necessary to protect the beds from the depredations of the sting-rays with stake fences. No advance can be made in the cultivation of clams unless individual fishermen can control their own beds. The law on the subject should be thoroughly investigated to see if it is not possible under the Fish and Game Districting Act, or otherwise, to apportion beds to fishermen.

Recent great advances in oyster culture in the state of Washington make it certain that similar progress can be made here. Our production of oysters should be on the increase instead of remaining at a standstill. Our oyster and clam resources need to be thoroughly investigated by an expert and the ways and means pointed out for developing this neglected industry. Over 25 years ago C. H. Townsend made a report on the oyster resources of California for the United States Bureau of Fisheries. This report may be found in the 1893 report of the United States Commissioner of Fisheries. It was the result of a preliminary scientific survey of our oyster resources and the author was decidedly of the opinion that our oyster production could be greatly increased, and, even at that early time, complained of the antiquated methods pursued in the industry. Since that time we have made little improvement and no oyster expert has since visited our oyster beds, although the Bureau of Fisheries has several such who have been of invaluable assistance to oyster growers on the Atlantic coast. This has not been a case of neglect, for the truth is we have not asked them to come, as the industry has not been awake to the importance of oyster investigation work.

We have a sea mussel that abounds along nearly our entire 1000 miles of coast, clinging to the rocks in compact masses. In many places it is extremely abundant. These mussels have a food value equal to that of oysters. They are most excellent when canned or pickled. They grow more rapidly than oysters and the weight of the shell compared with the meat is much less than in oysters. All that is lacking is an inclination on the part of the public to eat them. They are eaten extensively in Europe, where in many places they are cultivated on barriers set up for the purpose.

On our Atlantic coast there is a mussel almost identical to ours, for which the United States Bureau of Fisheries is at the present time endeavoring to create a demand. There is some difficulty on the Atlantic coast in inducing the public to eat the sea mussel, for the Indians for some reason shunned it, preferring the mud clam, of which there was plenty. On our coast there can not be this prejudice, for the Indians along our entire coast subsisted mainly on them. There is an almost unlimited supply of these mussels and if it becomes necessary the production can be increased. We have, besides the large sea mussel, two species of smaller mussels that are found in the quieter waters of the bays and in estuaries at the mouths of streams. These species are occasionally found in the markets. We expect to start an educational campaign to induce the people to make use of these valuable shellfish.

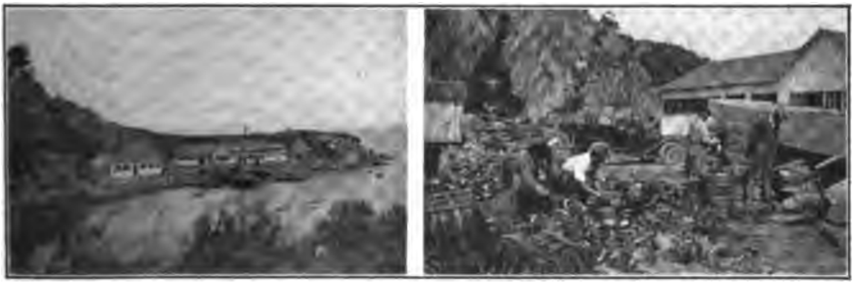


Fig. 60. Point Lobos Abalone Cannery. Cleaning abalones at Point Lobos Cannery. Photographs by H. B. Nidever.

Recommendations.

We recommend that our system of taxing the fisheries be revised. Under the present system the revenue is derived from market fishermen's licenses, wholesale fish dealers' licenses and from fines imposed. The annual revenue from these licenses is about $40,000, which is not nearly adequate to cover the present expense of commercial fisheries patrol, propagation of commercial fishes and investigation work. A market fisherman now pays ten dollars a year and a wholesale fish dealer pays five dollars per year. Under this system the poorest clam digger pays double the license paid by the largest wholesale dealer or canner. The tax on dealers is ridiculously small, while ten dollars is too much for many of the fishermen. California is behind the other states and other countries in the matter of taxing its commercial fisheries and the main reason our fisheries have not advanced more rapidly is that the state has not had sufficient money for its commercial fisheries work. The system employed in Oregon, Washington and Alaska, as well as in most of the Atlantic states, is to tax the fishermen according to the apparatus they use and the canners, packers and wholesale dealers according to the amount of fish they handle, and where oyster and clam beds are controlled by individuals the beds are taxed according to their yield. This system is more just and equitable and will yield a larger revenue. With an increased revenue we could do much that at the present time we are not able to do. In southern California, which now leads in the importance of its commercial fisheries, we need at least two good seaworthy boats for patrol and investigation work. These boats should be equipped with hoists for the use of dredges, trawls and pelagic nets and each should have a man in its crew who has had sufficient scientific training to enable him to carry on investigation work under the direction of a competent central head. We need to complete the investigations begun on the spiny lobster and edible crab and to conduct experiments on propagating these two species as well as to propagate certain forms of marine fishes, the artificial propagation of which has been carried beyond this experimental stage in other places. We need to investigate and learn all we can of the habits and life history of the albacore and other commercial fishes, for we know little about any of them. Furthermore, we should have a thorough investigation of the kelp industry and of the effect of cutting the kelp beds. We need also a biological survey of our coast and of our streams and lakes. All of the above could be done and our commercial fisheries thereby be greatly benefited.

Respectfully submitted.

(Signed) N. B. SCOFIELD,
In Charge, Commercial Fisheries.

REPORT OF BUREAU OF EDUCATION, PUBLICITY AND RESEARCH.

The Honorable Board of Fish and Game Commissioners
of the State of California.

GENTLEMEN: We have the honor to submit herewith the first biennial report of the Bureau of Education, Publicity and Research, covering the period from the institution of the bureau in September, 1914, to the end of the fiscal year 1915–16.

Organization.

At a called meeting held in San Francisco on July 5, 1914, your honorable board unanimously passed a resolution embodying the institution of educational and publicity work to be carried on by a suitable assistant who should be given the title of Game Expert and placed under civil service. In September, 1914, the present director assumed temporary charge of the new bureau and later qualified under civil service. A definite scheme of operation was immediately worked out and the bureau has followed in a general way the original plans laid down. The work accomplished has naturally been limited, owing to the fact that the duties fell upon one individual. An office was established at the Museum of Vertebrate Zoology at the University of California, where opportunities for undisturbed work and library and museum facilities were of the best. With the permission of your board the head of the bureau continued to hold a position with the University of California as Economic Ornithologist.

As the name of the bureau signifies, the work is of three kinds: education, publicity, and research. This report therefore will fall under these three headings.

Education.

Salisbury Wild Life Pictures. During the fall of 1914 the Fish and Game Commission cooperated in displaying throughout the state the Salisbury Wild Life Pictures. These films were obtained by E. A. Salisbury, director of the Educational Film Company of Los Angeles, in southern Oregon and northeastern California. In that the pictures illustrate the life histories of some of the common game birds and mammals of the state of California and vividly portrayed some of the fundamental aspects of wild life conservation, the commission felt justified in giving them support. For several weeks in the fall of 1914 the Director of the Bureau of Education, Publicity, and Research, traveled about the state giving lectures with these pictures and emphasizing wild life conservation. On a single trip alone in the San Joaquin Valley, over 10,000 people saw the pictures and heard the lectures.

The success of these films in eastern states and the comments upon them received from conservationists, have fully justified the effort made by the commission to place them before the people of this state.

Lectures. More than one hundred illustrated lectures have been given by this bureau in various parts of the state. These have advertised the wild life resources of California and have carried the message of conservation to farmers' organizations, women's clubs, Audubon societies, high schools, grammar schools, and boy scouts.

Fig. 61. Young mountain lions. From Salisbury's wild life pictures. (Courtesy Mr. E. A. Salisbury.)

A series of lectures was given during the spring semester of 1915 and again in 1916 in a course in advanced vertebrate zoology in the University of California, the students of which are prospective teachers. Several lectures were also given in a zoology course based largely upon the animal life of Berkeley and the Bay region. Through the cooperation of the forestry department of the University of California, a series of six lectures on game and game conservation was given during the spring semester of 1915 in a course on forest protection. These lectures reached many outsiders in addition to the fifty students registered in the course, for the series was open to the public. During the spring semester of 1916, a similar series of nine lectures was given before the 350 registered students in a course on general forestry and the many outsiders attracted by the publicity given the lectures. It is peculiarly fitting that forestry students in California should have a fundamental knowledge of wild life, for many of those entering forest service work in this state will become game wardens by virtue of their positions. The success of these series of lectures is in a measure due to Professor Walter Mulford, head of the Department of Forestry, who encouraged the institution of cooperative work, and to Dr. J. Grinnell, N. B. Scofield and T. I. Storer, each of whom assisted by giving one or more of the lectures. The results attained show that the subject of fish and game is of such general interest that a full course on fish and game given in the state university under the direction of the bureau would be productive of valuable results. With the incentive that such a course would give, many forestry students might become sufficiently interested to take up work as game wardens, and many university students would receive sufficient knowledge of game and game conditions to make of them valuable allies of game conservation.

Fig. 62. White pelican feeding young at Clear Lake, Modoc County. From Salisbury's wild life pictures. (Courtesy Mr. E. A. Salisbury.)

In helping to make the students of our state university more familiar with our fish and game resources, we believe that we are carrying on fundamental work which will show abundant results in the future. University students have the opportunity to leaven the public sentiment of this state as regards wild life conservation, as no other group of citizens.

Recognizing that the understanding and sympathy of the child is fundamental to the successful attainment of the conservation measures of the future, effort has been directed toward the stimulation of nature study in the public schools. It has been found that, although nature study is a compulsory subject in our public schools, there are few places in the state where any pretense of adequately teaching this subject is made. In order to demonstrate the possibilities involved in work of this kind, the Director of the Bureau of Education, Publicity, and Research, addressed a meeting of teachers, and conducted several field trips in Sacramento. Classes of fifth graders were taken to the city parks and to the outskirts of the city, and were taught the names and habits of the different forms of life encountered. Partly as a result of this endeavor, nature study and trips afield have been permanently established in the public schools of Sacramento. It is hoped that other cities will soon recognize the value of teaching children to "read a roadside as they read a book," and will institute similar work. The ultimate goal, of course, is to have nature study supervisors in every city in the state, each with planned courses of study which shall include field trips where children may learn to study wild life at first hand. To this end proper training of prospective teachers is fundamental. When teachers are asked to take up nature study they either complain that they have not had the training to fit them for the work, or that no material is available. The attempt therefore is being made to stimulate interest in this phase of education in our normal schools, universities, and colleges, and to furnish, in the form of leaflets and bulletins, material which will be useful to such teachers.

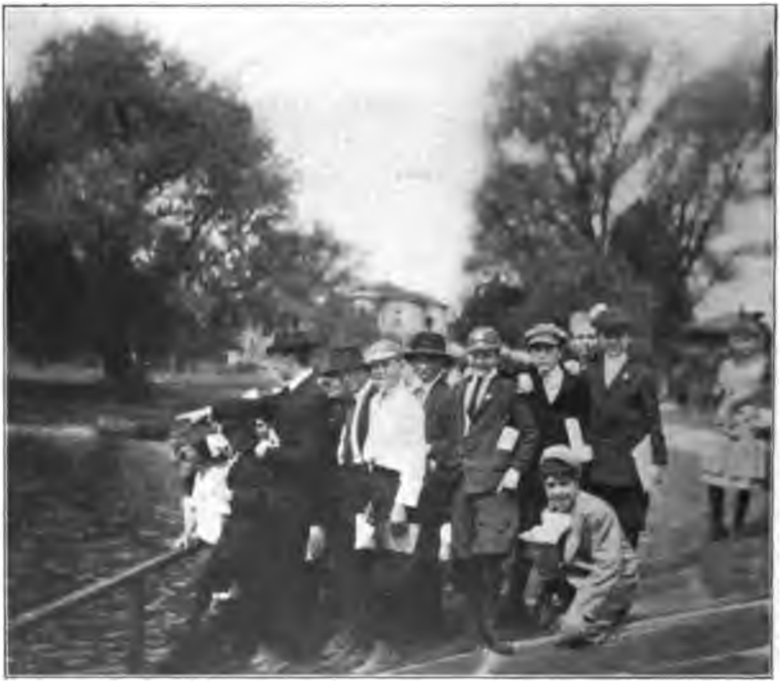


Fig. 63. Fifth graders of Sacramento public schools being taught the fundamentals of game conservation at Southside Park, where many waterfowl are to be found on the lake. Photograph by H. C. Bryant.

Outlines for courses of study in game resources and conservation methods have been prepared for women's clubs, boys' agricultural clubs and boy scout organizations. These will soon be available for distribution.

Boy scout cooperation—Believing that the boy scout is in a position to aid materially in the enforcement of fish and game laws and in the care and conservation of wild life, a cooperative arrangement has been instituted which will be of value to both the scouts and the commission. By cooperating with the commission the scout not only becomes a better citizen but prepares himself for the merit badge in conservation, requirements Nos. 2, 4 and 6 of the manual particularly specifying this kind of work.

Credit will be given boy scouts for the following types of work:

1. The dissemination of knowledge on the fish and game laws, the work of the California Fish and Game Commission, and on wild life conservation. (It would be of great aid to the commission if boy scouts would always take the opportunity to inform campers, hunters, and others with whom they come in contact, of the fish and game laws, warn them of their liability for violation of these laws, and report all violations to the nearest game warden.)
2. The finding and reporting of wild game which has been injured or destroyed in numbers either through natural or artificial means.
3. The systematic feeding of game during severe winters, or the encouragement of wild birds through feeding, the planting of cover, or the building of nest boxes.
4. The taking of a census of any one game species in a restricted area.
5. The destruction of predaceous animals injurious to wild life or the destruction of that worst of bird pests, the European house sparrow, usually called English sparrow.

In return for cooperation, the commission will award a prize (or prizes if necessary) of a pair of golden pheasants to the boy scout who does the most cooperative work. Scouts wishing to qualify for the above prizes are to report regularly on the work accomplished. If sufficient interest is shown in fish and game cooperative work a merit badge will be offered later by the commission.

To stimulate interest in this cooperative work and to interest scouts in game conservation a series of illustrated lectures and a series of field trips for the boy scouts in the Bay region is being planned.

Publications. The series of teachers' bulletins prepared by Miss Gretchen Libby while Educational Assistant of the Fish and Game Commission, have been in great demand, as has also her bulletin entitled "Bird study in the public schools," our supply of which is now exhausted. To augment the supply of printed matter for teachers, several articles have been published in CALIFORNIA FISH AND GAME designed mainly for their use, and teachers' bulletins No. 6, entitled, "Bats as Desirable Citizens," by J. Grinnell, and No. 7, entitled "The Control of the House Sparrow in California," by H. C. Bryant, have been added to the bulletin series for the use of teachers. The Bird and Arbor Day Manual for 1916, issued by the Superintendent of Public Instruction, contained several articles furnished by this bureau dealing with the wild life resources of the state, and with suggestions as to how these resources may be presented to pupils in the schools.

In order that those contributing to, and interested in, the conservation of wild life in California might receive direct information from the commission administering the wild life resources, the publication of a quarterly illustrated magazine entitled CALIFORNIA FISH AND GAME was begun. The motto chosen for the publication was "Conservation through education." The first number appeared in October, 1914. The October number, 1915, completed volume 1, a volume containing 261 pages and 58 illustrations. The departments regularly appearing were general articles, editorials, hatchery and fishery notes, conservation in other states, life history notes, wild life in relation to agriculture, and reports. The editor has taken pains to select only authentic contributions for publication and has eliminated as far as possible the imaginative and hearsay tales which so often appear in like periodicals. Such sentiments as the following have been editorially expressed in the magazine: the effectiveness of game preservation is governed by the interest of the people, and the spirit of those who hunt and fish; the recognition of scientific truths combined with a practical knowledge of the working of correct laws are essential things in the working of game administration; accurate statistical information is the one essential foundation upon which protective legislation must rest; nothing can be of more value to the cause of game protection at the present time than a systematic campaign of education conducted officially by the game department in every state in the Union. The second volume of CALIFORNIA FISH AND GAME, two numbers of which have already appeared, will surpass the first volume in the character of the illustrations and in the articles published. The periodical is sent to citizens of the state who make application, and to game departments and interested parties in other states. The demand for this publication has proved to be so great that the first editions numbering five thousand became inadequate, and later editions had to be materially increased. Nor does the information contained in CALIFORNIA FISH AND GAME reach only those to whom the magazine is sent; for newspapers regularly copy articles printed therein. More than seventy-five newspapers copied articles from the October, 1915, number.

Several public hearings have been held under the auspices of this bureau. Through meetings of this kind the commission is able to obtain an expression of public sentiment exceedingly valuable in the administration of game laws. Free discussion of the points at issue has in each instance resulted in a better understanding between the hunter and fisherman, and the commission (see Fig. 64).

Fig. 64. Interested listeners at a hearing on salmon and trout, held at Santa Rosa, February 9, 1916. Photograph by H. C. Bryant.

Publicity.

The bureau has relied largely on CALIFORNIA FISH AND GAME as a medium of publicity, but further efforts to gain publicity for the state's game resources and the work of the commission have been made. A series of twenty articles on "California Game Resources" was furnished the San Francisco *Call and Post*. This series dealt with various game fishes, birds, and mammals of California and the distribution, recognition marks, habits, status, and value of each for food and sport, was given. This series of articles was simultaneously published in the Los Angeles *Herald* and subsequently in about twenty other newspapers. The bureau stands ready to furnish any other newspaper with a similar series of articles. The bureau has also kept in touch with such central news agencies as the Associated Press and United Press, and numerous mimeographed news letters have been sent to all of the newspapers of the state. Evidence of the effectiveness of the news-letter plan of publicity is evident from the results of the campaign against the English sparrow. A news-letter giving details of the contemplated control of the sparrow sent to each newspaper resulted in the appearance of the item in more than 180 different newspapers. A follow-up news-letter on the same subject was also widely used. In many instances photographs and cuts have been loaned to newspapers and magazines.

This plan of conducting newspaper publicity by gathering and sending out news items from a central office is undoubtedly the most effective and desirable method of gaining publicity, and should be more largely followed in the future. Its advantages are that it allows of a wider circulation of the publicity item and of a closer and wiser censorship than is otherwise possible.

Research.

Careful attention has been given to the gathering and filing for reference of data on the game birds and mammals of the state. Many letters asking for information have been sent out and the district offices have cooperated by sending in useful information. The most detailed reports so obtained have been on the mourning dove, ring-necked pheasant, and beaver. A collection of photographs is also being accumulated. As a result, the bureau in time will have in its possession an invaluable photographic record of the present status of game and of the work of the Fish and Game Commission.

An attempt to increase interest in the fur-bearing mammals of the state has been made in the study of the fur trade in California, published under the title, "California's Fur-bearing Mammals." An historical survey demonstrated the decreasing worth of a once valuable resource, and the great need for legislation which will give complete protection to certain species and protection to all fur-bearers during the time when their fur is of no value. If the state of California wishes to conserve her fur resources, make them a source of income, and a heritage to pass on to future generations, she must fall in line with other states and better protect fur-bearing mammals.

A tabulation of the number of deer killed in the open seasons of 1914 and 1915 has been made. The reports of deputies and of forest officers showed that a total of 8,699 deer were known to have been killed during 1914, and a total of 8,343 in 1915. The fact that many deer killed are not reported by deputies and forest officers leads to the conclusion that at least 12,000 deer were killed during the open season of each of these years.

An attempt to obtain information in regard to hunting accidents in the open season of 1915 showed eight men to have been killed because they were mistaken for game, nine men to have been severely wounded, and seven to have been killed by the accidental discharge of a gun while hunting. The reports of accidents were necessarily incomplete, but they were sufficient to vividly show the criminal carelessness exhibited during each hunting season. It is important that the hunting fraternity understand that there is nothing accidental in the results attained when an object, the identity of which is in doubt, is fired upon.

In furtherance of the investigation of the food habits of nongame birds instituted in 1911, a study of the food of the roadrunner has been completed and a full report is in press. Eighty-three stomachs were examined and the contents identified. The results of the investigation have not sustained the oft-repeated accusation that the roadrunner is a destroyer of the eggs and young of valley quail. Although young birds are occasionally taken as food, there is no evidence that quail are preyed upon to the exclusion of other small song-birds. (See Fig. 66.) The bulk of the food of the roadrunner is made up of insects, especially beetles, grasshoppers, crickets and caterpillars. Lizards and snakes and mice comprise the larger part of the vertebrate food taken, but small birds are sometimes eaten (see Fig. 66). One

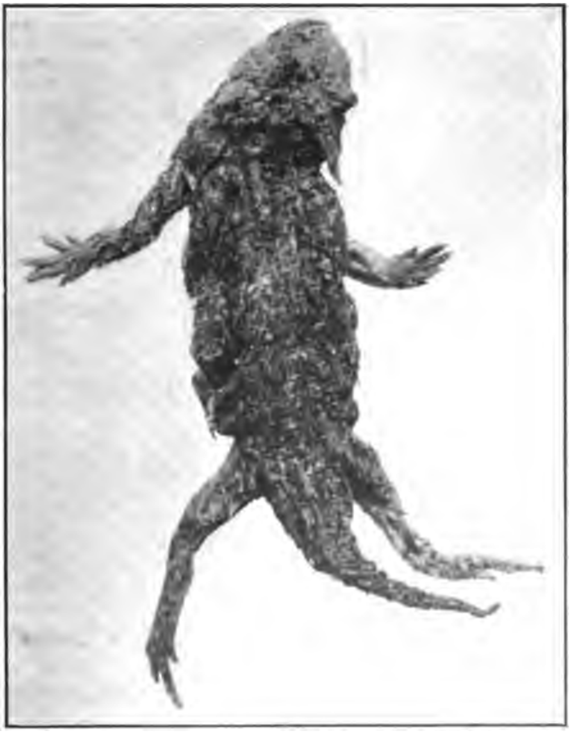


Fig. 65. A Blainville horned toad taken from the stomach of a roadrunner. Photograph by H. C. Bryant.

outstanding feature of the diet of the birds examined was the preponderance of one kind of vegetable food—the fruit and seeds of the sourberry, *Rhus integrifolia.* Large numbers of cicadas and several scorpions had been eaten by the birds. The roadrunner's relationship to the cuckoos is emphasized by its fondness for hairy caterpillars, many of which had been eaten. The lack of evidence as to the roadrunner's attacks on valley quail, plus the benefits conferred by it in the destruction of insect and rodent pests, plus its esthetic value, leave a balance distinctly in favor of the bird and make it a beneficial rather than an injurious species.

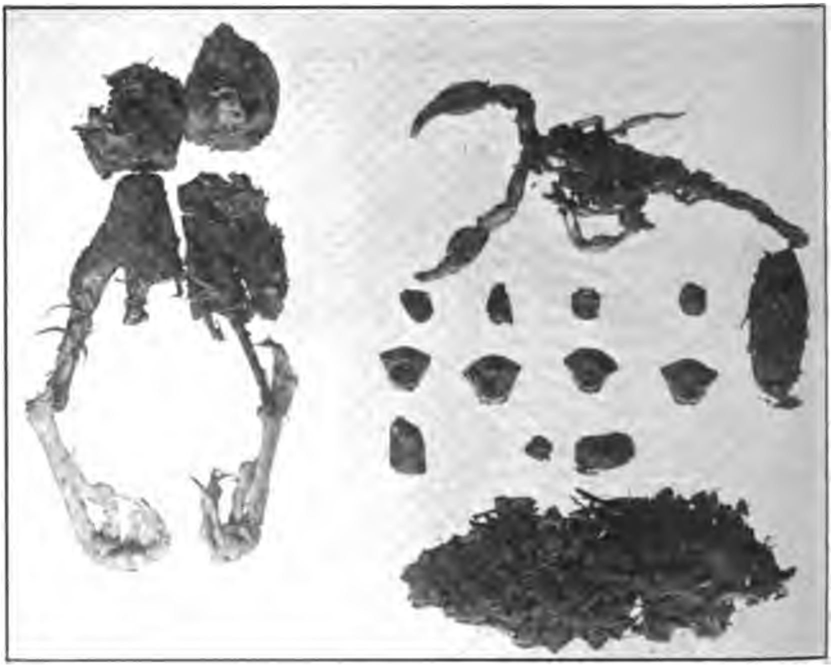


Fig. 66. Stomach contents of roadrunner, showing remains of an Anthony towhee, a scorpion and parts of several cicadas. Photograph by T. I. Storer.

A study is being made of the food of ducks in this state, with a view to the increase of the available food supply by artificial plantings and the furnishing of a means of attracting waterfowl. A large number of duck stomachs is at hand and many of these have already been examined and the contents of each recorded.

A study is also being made of attempts to acclimatize foreign game birds in California, with a view of discovering the reasons for success and failure, and of what may be expected from future trials. After a review of the history of the introduction of exotic species, it is quite evident that the results have not been proportionate to the money and energy expended. Two of the principal causes of failure appear to be the lack of careful investigation of the inherent factors limiting acclimatization and of the method of liberation. The successful establishment of a species has been found to be possible under favorable conditions, and ultimate success in acclimatizing foreign species therefore lies in careful experimentation. But though acclimatizing game birds is a possibility, it is an open question whether it is desirable to supplant native species with foreign ones. The native fauna is usually the most desirable, and the result of our finding seems to show that California should take a stand with other states in protecting her native game rather than attempting the introduction of foreign species. The valley quail is a better game bird than the pheasant or any other foreign species. Concentration on methods of conserving this bird is, therefore, more important than futile attempts at acclimatization. In the increasing stocking experiments carried on by individuals great encouragement may be found. Many people now successfully propagate quail in captivity and liberate the increase.

The present status of the beaver in California, according to data gathered in this office, is precarious. Colonies of this valuable furbearer are few at the present time, and give promise of becoming even more scarce. The Hudson Bay Company, when operating in California, beginning in 1828, secured thousands of beaver skins each year, and thereafter considerable numbers were taken each year by trappers. Since 1911, however, it has been necessary to give total protection to this animal, but even thus protected beavers do not seem to have increased to any considerable extent. The few scattered localities in which colonies are now to be found are shown on the accompanying map (Fig. 67). In the San Joaquin and Sacramento river basins, where beaver are most abundant, reclamation projects are fast driving them to starvation, or to more limited quarters. The total extirpation of the beaver in California is not far distant unless further measures are taken for its protection. The bureau plans to show the present status of many other game birds and mammals by means of distribution maps similar to that giving the distribution of beaver.

Considerable complaint that blackbirds damage rice has been received by the commission. Investigations show that the complaints are well founded. Some sort of control measures should be instituted and further investigations leading to the discovery of some practical method of meeting the situation are planned.

The chief forest deputies of the national forests of this state report annually to the commission the game conditions in their districts. These

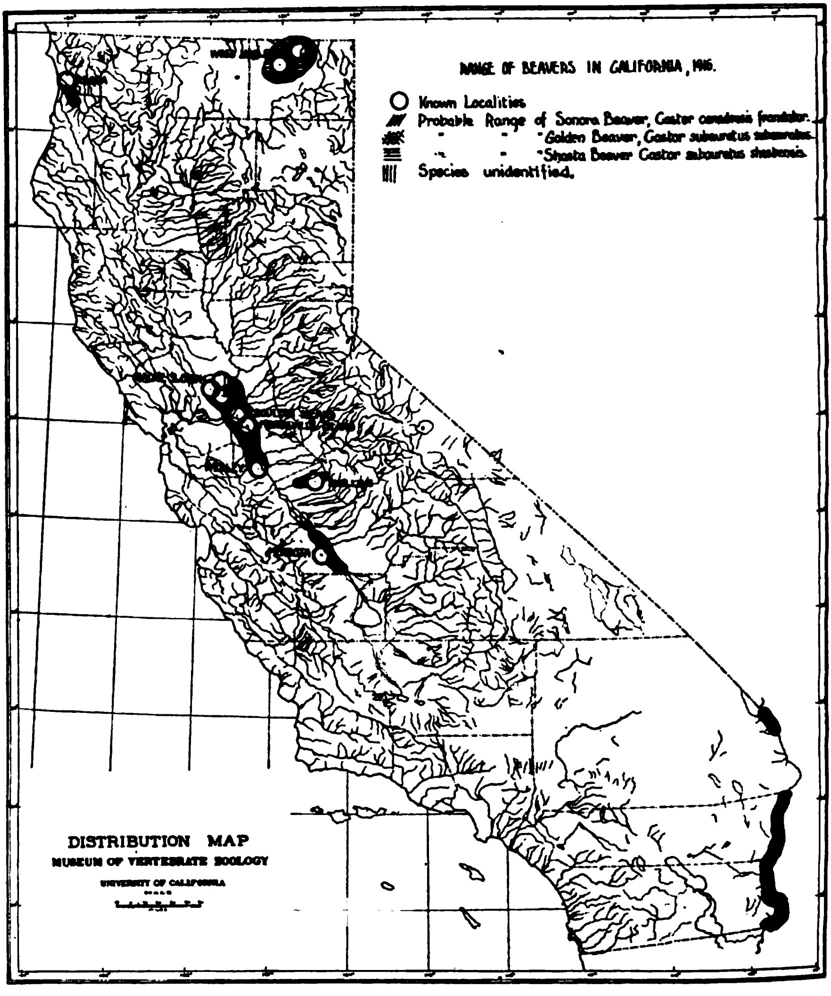

RANGE OF BEAVERS IN CALIFORNIA, 1916.
○ Known Localities
Probable Range of Sonora Beaver, Castor canadensis frondator.
" " " Golden Beaver, Castor subauratus subauratus.
" " " Shasta Beaver Castor subauratus shastensis.
Species unidentified.
DISTRIBUTION MAP
MUSEUM OF VERTEBRATE ZOOLOGY
UNIVERSITY OF CALIFORNIA

Fig. 67. Map showing distribution of beavers in California in 1916. Although once very numerous, few beavers are to be found at the present time.

reports afford much valuable information on the life history and status of the various species of game birds and mammals. Such items as demanded immediate attention have been investigated, and much of the information contained in the reports has been utilized.

A book on the game birds of California, in preparation under the auspices of the University of California Museum of Vetebrate Zoology, under the joint authorship of Dr. Joseph Grinnell, the director of this bureau, and Mr. T. I. Storer, is almost ready for the press. Although the routine work of the bureau has precluded continuous participation in the preparation of the manuscript during the past two years, all available spare time has been given to a furtherance of the project.

Google

In addition to introductory chapters dealing with problems allied to the game birds of the state, full discussion of the distribution, life history and habits of every species of game bird found in California will be given, and the whole will be profusely illustrated. Whether the book is published by the Fish and Game Commission, or under other auspices, it should meet a long-felt need in that it will be serviceable to both the technical and nontechnical student, and will be useful as a sportsman's handbook.

In addition to the above researches, there have been a number of field investigations. The condition of the duck breeding grounds in the vicinity of Los Banos, Merced County, and Alvarado, Alameda County, were studied in 1915, with a view to determine the productive capacity of a given area of swamp land. A nesting colony of egrets near Crows Landing, Stanislaus County, was visited, as were also beaver colonies at Mendota, Fresno County.

The above have been some of the outstanding features of the many activities of this new bureau. In conclusion, we believe that the Bureau of Education, Publicity and Research, has justified its existence by its accumulation and output of accurate information regarding the wild life resources of California, and that a further expansion of the work would promote the interests of wild life and of the commission concerned with its conservation.

Respectively submitted.

(Signed) HAROLD C. BRYANT,
In Charge Education, Publicity, and Research.

REPORT OF THE LEGAL DEPARTMENT.

To the Honorable Board of Fish and Game Commissioners

GENTLEMEN: I herewith submit to you a report of the work of the legal department of the commission for two years, ending June 30, 1916.

During this biennial period there have been many interesting legal matters which have come up in the work of the Fish and Game Commission. The period has been marked by the greatest number of cases ever made by the deputies of the Fish and Game Commission in any similar period of time. There has been more active help and cooperation from citizens than at any time in the past. In former years, it was practically certain that when a violator demanded a jury trial he would be acquitted, but at present in most parts of the state the chances are not greatly in his favor. In many instances jury trials have been won where the evidence was far from conclusive.

In July, 1914, in the District Court of Appeals in Los Angeles County, the case of *People* vs. *Mascola* came up on appeal. The attorney for Mascola contended that the Districting Act, which had been passed by the legislature in conformity with the constitutional amendment of 1902, was unconstitutional in that it prohibited the people of certain sections from doing that which was allowed in other sections. In the decisions handed down by the court the contention of the appellant was overruled but the title of the Districting Act of 1913 was declared faulty, and the act was set aside. In the decision it was also noted that laws must apply uniformly over each district and that it was not constitutional to except certain sections within the district. On account of this decision it was necessary to revise the Districting Act and to change many of the laws on the statutes. This was done at the 1915 session of the legislature.

One of the most difficult problems, and also one of the most important, that comes before the Fish and Game Commission is compelling canal owners to maintain fish screens in irrigating ditches and to construct and maintain fish ladders over dams. In many instances long and bitter litigation has been carried out.

Before fish screens that would operate under all conditions had been perfected, it was practically impossible to compel the installation and maintenance of screens. At the present time, however, screens have been developed that will operate under any and all conditions and there is not a canal in the state in which it would be impossible to maintain a proper screen.

During November, 1915, the canal companies owned or controlled by the Fresno Canal and Irrigation Company were notified that they would be required to screen their ditches in such a way that all fish life would be prevented from passing into the canals. After notice was given the companies through their attorneys, they demanded a hearing, as provided by the statute passed by the legislature in 1915. Hearings were held in Fresno during January of this year. The testimony showed that great numbers of fish found their way through the canals and were destroyed. Upon the evidence introduced at this hearing, the commission ordered the companies to install screens in the Fresno ditch, Riverdale ditch, Kings River ditch, the Fresno Canal Company's ditch, Consolidated Canal Company's ditch and the Fresno Canal and Irrigation Company's canal. The companies failed to conform with this order and complaints were sworn to in the Justice's Court of Fresno County, and are now pending.

Numerous hearings have been held under the provisions of the sections of the code relating to screens and fish ladders. In the majority of instances entirely satisfactory conclusions have been reached without it being necessary to resort to the courts.

In March, 1915, John C. Robbins, of Tehama County, an unsalaried deputy of the Fish and Game Commission, was arrested by Forest Ranger Harvey Abbey for killing deer during the closed season. Robbins demanded a jury trial, but was convicted and fined $150 by Justice Lennon of Red Bluff. The District Court of Appeals was asked for a writ of habeas corpus questioning the validity of the judgment of the Justice. The writ was denied and the judgment of the Justice's Court affirmed.

In April, 1915, Fred W. Robins, another unsalaried deputy, living in Santa Clara County, was arrested for angling without a license. He demanded a jury trial before Justice Simpson of Almaden; was convicted and sentenced to a fine of $50 and to serve ten days in jail. He appealed to the Superior Court, but this higher court affirmed the judgment of the lower court.

From time to time in the past it has been reported to the Fish and Game Commission that considerable numbers of striped bass were being shipped to various points outside of the state, in violation of the state law prohibiting the export of striped bass. In March, 1916, very reliable information was received and one of the deputies of the Fish and Game Commission was sent to Salt Lake to make an investigation. As a result of his investigations, A. Paladini was arrested on a number of charges and was convicted in the Police Courts of San Francisco, being fined $100. An appeal was taken and the case is still pending. At the same time a number of other charges were filed against Paladini. These are being held subject to the appeal in the case mentioned.

In November, 1914, Deputy George J. Rodolph, while engaged in patrol duties in the vicinity of Los Banos, attempted to arrest Len

Cisco and Earl Farnsworth for violation of section 626*n*. Cisco and Farnsworth resisted arrest and Rodolph was shot in the back after Farnsworth had been wounded by him. Rodolph died almost instantly. Both Cisco and Farnsworth were charged with murder. Cisco was discharged at the preliminary examination and Farnsworth held for the murder. He was tried in Merced in June and was acquitted by a jury. In our judgment the verdict was a gross miscarriage of justice. Rodolph sacrificed his life in the service of the state and should be enrolled among those to whom the state owes all honor.

During the early summer of 1915, the H. N. Welch Company, a corporation organized under the laws of the state of Utah, made several shipments of trout from Salt Lake City, Utah, to Los Angeles, that were not in accordance with the laws of the state of California. These shipments were seized by deputies of the commission. The Utah Company brought suit against the Fish and Game Commission in the United States District Court at Los Angeles and asked for an injunction restraining the commission from interfering in any way with shipments of trout, contending that the act was unconstitutional, citing numerous authorities in support of their contention. In June their motion for a temporary injunction was argued and denied. Later in the same month the whole action was dismissed. It was said that the Welch company would appeal to the Supreme Court, but this was never done.

This case was one of the most important that has come up in the history of the commission. If the complainants had been upheld in their contention, it would have been the most severe blow that could have been given to the game interests of the state, as it would have been necessary for the Fish and Game Commission to prove in every instance that the game or fish possessed unlawfully was not brought from without the state.

A number of prosecutions have been begun against oil and gas companies for polluting the public waters of the state and in almost all instances the evil has been remedied by the companies. In cooperating with the commission, companies have installed the latest devices to prevent future pollution.

This department has given many decisions interpreting the fish and game laws of the state, and has written hundreds of letters answering inquiries regarding the construction of the fish and game laws.

During the two fiscal years just ended, the number of arrests was 2,087 and the number of convictions 1,747, or 83$\frac{7}{10}$ per cent convictions. The per centage of convictions for fish and game violations is higher than any other class of cases of like degree. In all instances of criminal violations of a particular class the imposition of punishment is measured by the sentiment of the people toward the enforcement of that particular class of laws. The large percentage of convictions in fish and game violations indicates most strongly the growing sentiment of the people toward conservation of the fish and game of this state and their strong desire for the strict enforcement of the laws pertaining thereto.

In a large percentage of cases fines are imposed and in some instances jail sentences without any alternative are inflicted on violators, which shows the increased cooperation between the commission and the justices of the peace in the enforcement of the fish and game laws.

Respectfully submitted.

ROBERT D. DUKE,
Attorney for the Board.

Dated: October 20, 1916.

REPORT OF FIELD AGENT.

The Honorable Board of Fish and Game Commissioners
of the State of California.

SIRS: With the closing of the fourth administrative district office, March 1, 1916, your honorable board established the former head of the Fresno Division in the position of Field Agent. The prescribed duties of the Field Agent were to represent the commission throughout the state, to correctly inform the commission of conditions affecting the fish and game interests in every portion of the state, and to supervise, in an advisory capacity, the activities of the deputies. It was believed that a Field Agent in circulating among the deputies would be of much assistance to them in solving their individual problems, in explaining the various rules and regulations of the board, and in bringing about a universal standard of efficiency throughout every section of the state.

The idea has been welcomed by the field force. Many deputies stationed in territory far removed from district offices have had small opportunity for receiving training and instruction as to how to satisfactorily comply with the rules and regulations regarding operations of field deputies. Very naturally, many problems arise in the daily life of the deputies which they find hard to solve according to the ideals of the commission, and to be able to confer on the ground with some official who can speak authoritatively, appeals to the deputies as a valuable privilege.

The general public too, apparently enjoys presenting its ideas to some one who can inform them of the commission's attitude and who, in turn, will directly carry the views of the public to the commissioners.

Among the investigations carried on have been the following: A market fisherman at Redding had been using a set-line for several years and had successfully defied the efforts of the commission to suppress his operations. A warrant was secured from the district attorney and the violator is now under bond. Oil pollution of the Sacramento River near Dunsmuir was investigated. Certain license matters have been adjusted with county clerks. Many forest service headquarters have been visited and the friendship existing between the Forest Service and the Fish and Game Commission cemented and better cooperative working conditions promoted. The commission has been officially represented at the meeting of the County Supervisors Convention, held at Redding, the Fresno Commercial Club and at several other conventions. Assistance has been given the Fresno Playgrounds Commission in the attempt to secure from the Forest Service permission to secure a playground site at Huntington Lake in the mountains of Fresno County. The initial plans of the Playgrounds Commission involve the taking of 5000 children into the high mountains annually. Furthermore, the Fish and Game Commission has been invited to instruct the children at the camp regarding wild life conservation.

A large section of the state has been covered, people met, complaints heard and information given regarding the activities of the commission.

The activities of the commission have been given publicity through a weekly column which has been edited in the San Francisco Bulletin.

The best work we have done, so far as we can judge, has been among the outside deputies. Their various problems have been solved or at least explained so that they can work independently. Each deputy with whom we have come in contact has been studied and an effort made to make him more useful to the state. The men all seem to be well pleased at the new order of things and they have gladly laid all their problems before us and have received our instructions with every evidence of appreciation.

It is the almost universal rule that the field deputies of this commission are very anxious to get results and to live up to the standards which the commission has set for them. The average deputy finds it hard to comply with various orders sent out by the head office in the manner expected by the commission. In justice to the deputies, account should be taken of the fact that the average patrolman who is in the field all day and has his mind upon his next day's work during his waking hours, is not in a position to do good work in the way of making reports and complying accurately with some of the orders sent to him. As a matter of fact, he often has small time to seriously study some orders which are to him a little unusual. We have been of material assistance to the fieldmen in showing them how to comply with such instructions.

Very naturally, the scope and importance of the work of the Field Agent will be enlarged and the value of the results accomplished can be judged to better advantage after the work has been under way a longer period of time.

Respectfully submitted.

(Signed) A. D. FERGUSON,
Field Agent.

REPORT OF SUPERINTENDENT OF STATE GAME FARM.

The Honorable Board of Fish and Game Commissioners.

GENTLEMEN: For the past two years the commission has been on the verge of abandoning the Game Farm. Difficulties with the owner of the land upon which the Game Farm is located, the fact that the commission feels that sufficient attempts to stock the state with pheasants have been made, and the general unfitness of the location for the work, each have contributed to this situation.

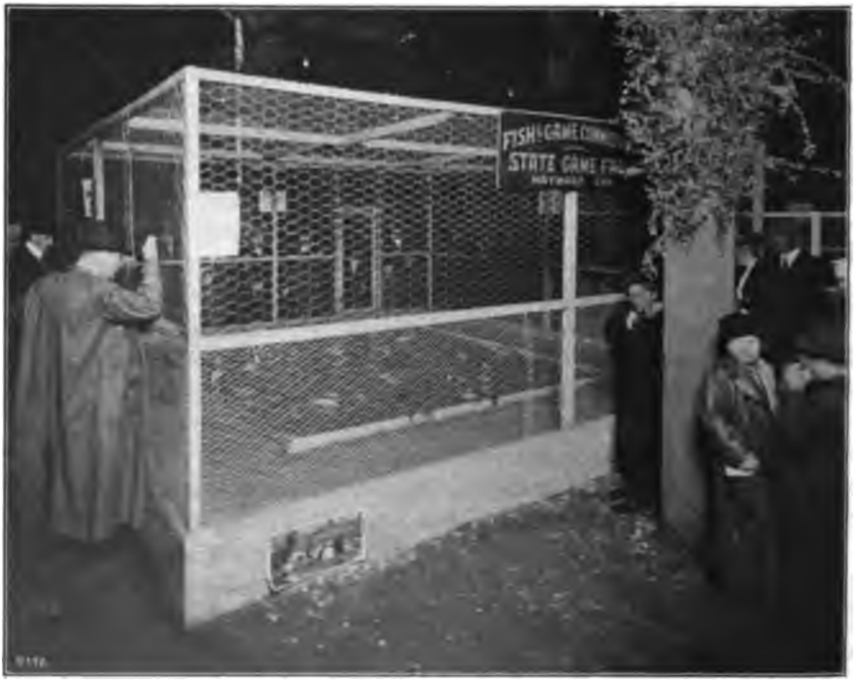


Fig. 68. Exhibit of State Game Farm at Children's Pets Exhibition, held at the Panama-Pacific Exposition, 1915. Photograph by Cardinell-Vincent Company.

Being unable to satisfactorily terminate the lease in 1915, your board decided to maintain the farm as an experimental station, devoting energy to the rearing of game indigenous to the state, such as valley quail, ducks and deer. Working under the above handicap, we have been unable to attain results which could have been attained under more favorable circumstances. Beginning with the fiscal year 1916, the surplus stock will be offered to breeders. Thus it is intended to make the Game Farm in a measure self-supporting.

Pheasants.

During the season of 1915, we had poor success with pheasants. Whereas a few broods did well and matured into fine birds, others were weaklings, more than half of which died during the first ten days. We can advance no reason for this, as the birds were hatched from the same parent stock. For example, we brooded two lots of chicks side by side on a grass plot, each brood being hatched twelve days apart from eggs laid by the same birds. Each lot was given the same attention, like food, and brooded in identical outfits. Out of one lot of 192 we reared 157; out of the other of 265 we lost over 200. As the birds were forced to lay so many more eggs during an extended period in captivity than they do in the wild state, there may be times when the germ becomes weak. In view of the fact that this is one of the very few states, possibly the only one, that uses artificial brooders exclusively, we can not ascertain whether or not this result is due to the (artificial) methods used. However, from results obtained during former seasons when domestic hens were used for brooding, we feel safe in stating that, while there is room for improvement in our method, it will be more generally adopted as pheasant breeding progresses.

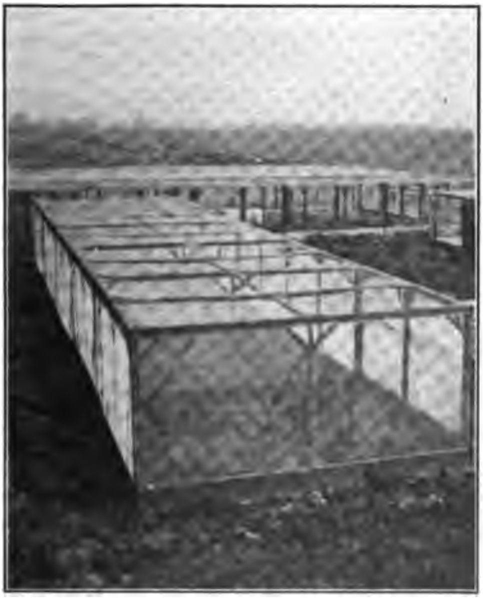


Fig. 69. Portable pens used for breeding quail and pheasants, State Game Farm, Hayward, California. Photograph by W. N. Dirks.

Feed.

During the 1915 season we devoted several hours each day to the preparation and grinding of food for the young birds, using green-stuff, such as lettuce, kale and beets, all of which was grown on the farm, together with cracked wheat, stale bread, hard-boiled eggs and cooked chopped meat. While the birds apparently relished this food, the results did not justify the time and energy expended.

During the 1916 season the birds were brooded on a lawn, thus affording them plenty of greens. Plain dry feed consisting of cracked wheat, cut oats with a sprinkling each of charcoal, ground green bone and oyster shell, which required practically no time to mix, was fed them. The birds appeared to do just as well on this dry mixture, which is more preferable, as it does not become stale and sour.

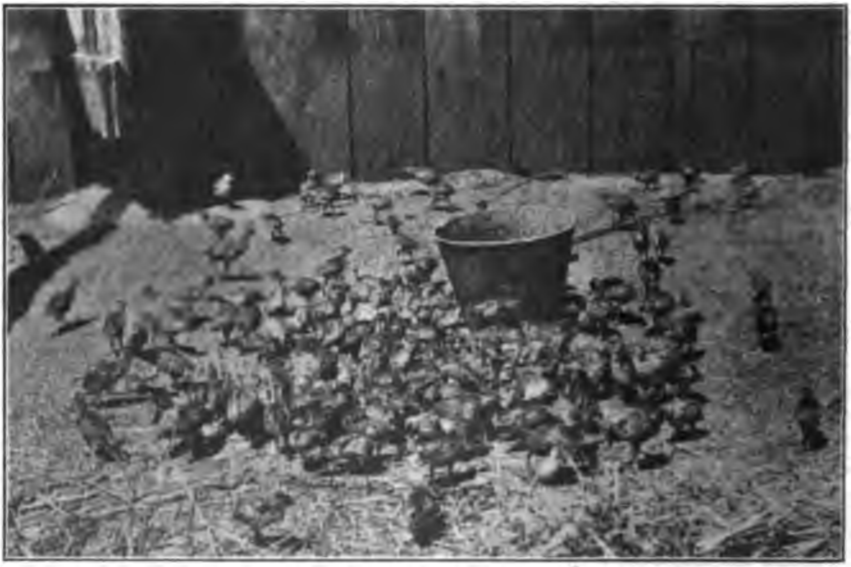


Fig. 70. Young pheasant chicks at State Game Farm. Photograph by W. N. Dirks.

Exhibitions.

The commission has exhibited the birds from the Game Farm at various poultry shows and county fairs. This has been done for the purpose of advertising the activities of the commission in the propagation of game and to educate people regarding opportunities in the breeding of pheasants, ducks and other game birds, both for stocking and for food purposes. Much interest was developed by these exhibitions, especially by those which were held at the State Fair and the Panama-Pacific International Exposition. At the Exposition there were displayed several varieties of quail, pheasants and ducks, the exhibit occupying a floor space of 12 by 100 feet. From the keen interest displayed at this exhibit, there appears to be a wide field for work of this nature. It gives those interested in hunting an opportunity to realize the beauty and variety of wild life, at the same time creating a more generally intelligent understanding of the work of the commission.

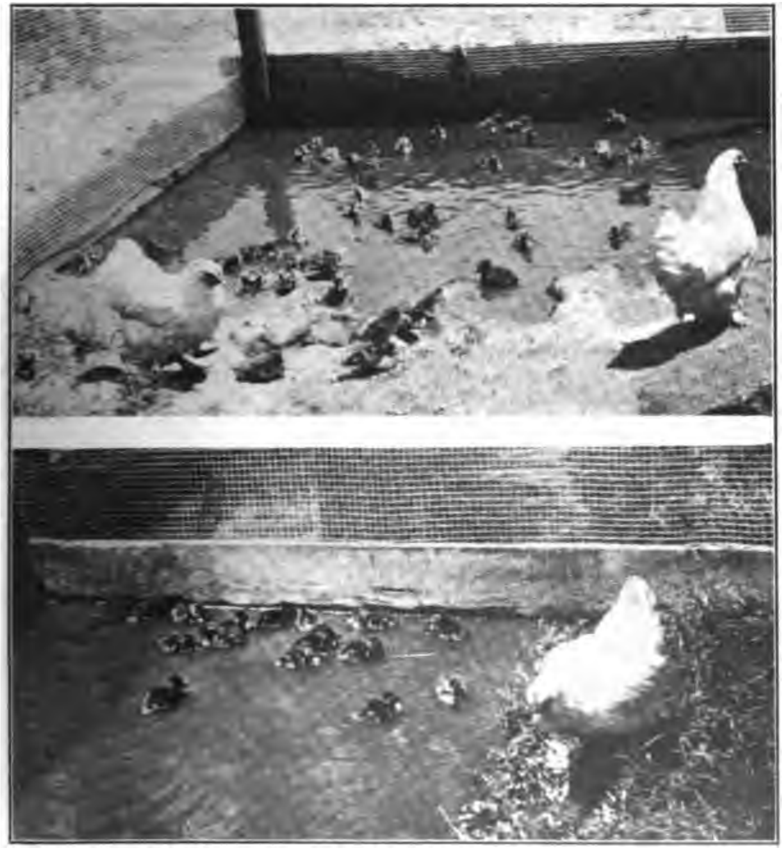


Fig. 71. Ducklings and their foster-parents at State Game Farm. The ducklings were hatched from eggs collected in nearby marshes and from those deposited by captive ducks. Photograph by W. N. Dirks.

Breeding Stock.

The breeding stock at the Game Farm on July 1, 1916, was as follows:

Valley quail, including young stock	350
Mountain quail	15
Bobwhite quail	20
Golden pheasants, including young stock	17
Silver pheasants, including young stock	14
Ring-necked pheasants, including young stock	140
Ducks (13 species, including fulvous tree-ducks)	575
Geese (4 species)	9
Coots	10
Great blue heron	1
Total birds	1,151
Black-tailed deer	2
Mexican white-tailed deer	1
Total mammals	3

Time will show whether or not the efforts of the commission respecting the planting of pheasants has been worth while. That they are firmly established in some localities appears certain. In the Santa Clara Valley, for instance, it is not an uncommon sight to see two or three pheasants foraging in the fields along well-traveled roads. On April 4, 1916, Deputy I. L. Koppel and myself put up a total of 15 pheasants at different points between Coyote and Milpitas. Although parts of the Santa Clara Valley seem to meet the requirements of the birds, certain factors will probably prevent them from ever becoming overabundant. Being very partial to moist ground, pheasants choose alfalfa fields in which to nest. As nesting occurs at a time when the hay is being harvested, a great many nests are destroyed. Through the efforts of Deputy Koppel, the Game Farm obtained a number of eggs from destroyed nests. Thirteen eggs taken from a nest of seventeen on April 22, 1914, hatched on the 24th. Eleven birds were reared to maturity, although these eggs were five hours on the trip. During the season of 1916 a total of seventy eggs taken from nests destroyed while mowing hay were received at the Game Farm. This justifies the adoption of some feasible plan whereby more of the eggs from destroyed nests could be utilized.

Fig. 72. Fulvous tree-ducks on pond at State Game Farm. Photograph by Theodore Kytka.

Quail.

Quail are brooded and fed exactly the same as the pheasants, but there is no resort to bantams for incubating the eggs. While we have had very poor success in artificially incubating the pheasant eggs for the entire period, the result is quite the contrary with quail, 90 per cent of the fertile eggs often being hatched. As the quail chicks are very tiny, it is a problem to obtain a brooder that will afford them sufficient heat, especially during the night. All brooders are planned and made to meet the requirements of young chickens. As the quail are many times smaller, it follows that they are much farther away from the heat-giving device. With a coal oil brooder the flame can not, with safety, be carried high enough to supply sufficient heat to the quail three inches below the bulb of the thermometer, which is set to register the temperature suitable to the chicken. To partly offset this condition we have raised the floor with burlap padding, bringing the birds closer to the heater. Quail themselves can best care for the chicks, but they must be penned up in individual cages made of small mesh wire and not be disturbed in order to have them successfully raise their own broods. Since this method is expensive and but few birds can be reared, it is probable that rearing quail for the market will never become a paying proposition. The only feasible plan that presents itself to conserve this bird is to locate a game farm in natural quail territory, absolutely protect the birds, and when the increase warrants it, trap and ship them to depleted localities. The future existence of this very desirable bird demands that steps be taken toward this end in the near future.

Fig. 73. Canada geese at State Game Farm. Photograph by Theodore Kytka.

Ducks.

From the modest number of three ducks, we have gradually accumulated, through trapping, taking eggs in the marshes and through the increase of our own stock, several hundred ducks. Fourteen varieties are represented which, with four varieties of geese and a number of coots, make an excellent collection of waterfowl. During the season of 1915 several mallard hens nested and successfully reared broods, taking the young ducks on the pond as soon as they were sufficiently dry. Our one cinnamon teal hen also nested and hatched nine young, but did not rear a single bird. During the present season, out of a total of twenty-six mallards nesting, the average of eggs was only five.

After several hens had lost their entire broods within a period of a few days, all of the eggs in the pens were gathered regularly and set in incubators. The ducklings were given to domestic hens to rear. If we had expected to operate this season necessary preparations would have been made for the proper handling of these birds. As it was, too many were confined together. One of the very peculiar features of these birds was brought out this past season when one shoveler out of a total of twenty hens that we have had for three years nested and hatched for the first time. None of the other species of ducks have nested. We have successfully retained several fulvous tree-ducks on the farm for the past two years. These birds have attracted a great deal of interest.

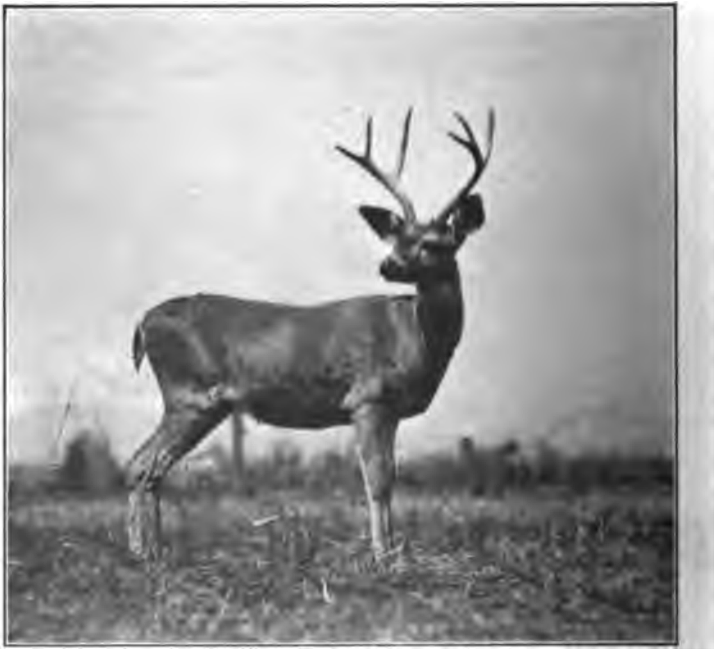


Fig. 74. Black-tailed deer at State Game Farm, Hayward, California. Photograph by Theodore Kytka.

Deer.

Several black-tailed deer which were on the farm for a number of years were disposed of in the fall of 1912. Since that time two deer of the same species have been secured and have found a home on the farm. One of these, a spotted fawn, has been successfully reared on a bottle. A Mexican white-tailed deer fawn has been the only other addition to our stock of game mammals.

Respectfully submitted.

(Signed) **Wm. N. Dirks,**
Superintendent State Game Farm.

REPORT ON POLLUTION OF WATERS.

The Honorable Board of Fish and Game Commissioners.

GENTLEMEN: The importance of keeping our streams and bays free from substances injurious to fish is conceded by all. Fish have a sufficiently hard struggle for existence without man contributing additional difficulties in the form of injurious waste products. Furthermore, fish which might not suffer from contact with, or absorption of, such substances, may face starvation because the plankton upon which they feed has been destroyed by pollution. It can, therefore, be considered a signal victory that section 635 of the Penal Code was so amended at the last legislature that it now includes practically all sources of water pollution.

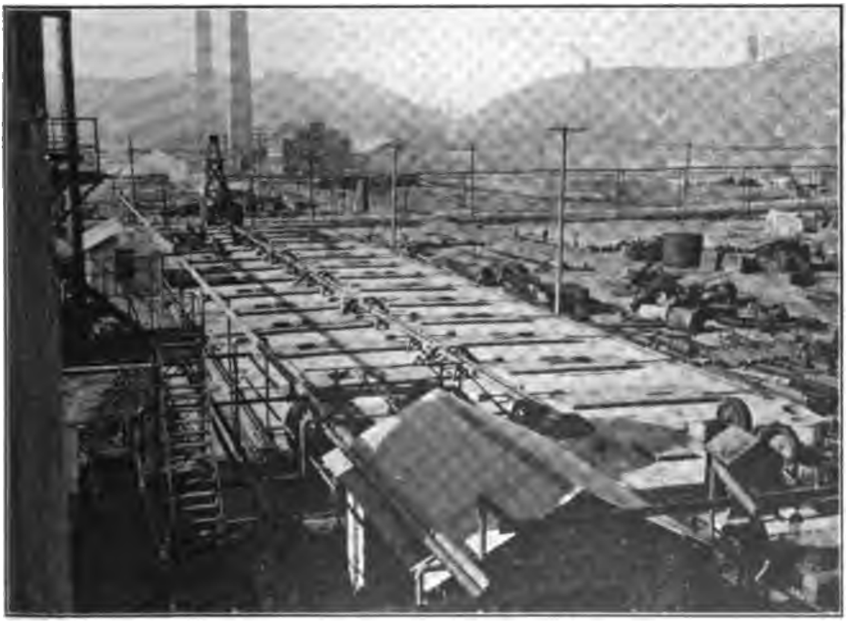


Fig. 75. Birdseye view of main separator of the Standard Oil Company plant at Richmond. The capacity is 20,000,000 gallons of waste per day. Photograph by A. M. Fairfield.

The most common sources of water pollution with which California has to contend are: refuse from wineries, wash-water containing leaves, rootlets, etc., from the beet sugar factories, lampblack and tar from gas plants, and fuel oils and sludge from steam vessels, refineries, and other industries which use oil as a fuel. The refuse from the wineries and beet sugar mills decomposes and ferments very rapidly after it is deposited in the water, forming carbonic acid gas which is deadly to fish life.

Particular attention has been paid to pollution by oil and lampblack. The problem confronts the gas companies of devising a rapid and continuous filtering system which will retain *all* of the lampblack and thus allow the water to return to the bay or stream perfectly clean. The magnitude of this undertaking will be better realized when it is understood that an average of twenty-two pounds of lampblack is produced to each thousand cubic feet of gas, and that San Francisco alone, during the month of January, 1916, manufactured 613,947,000 cubic feet of gas, and about 4000 tons of lampblack.

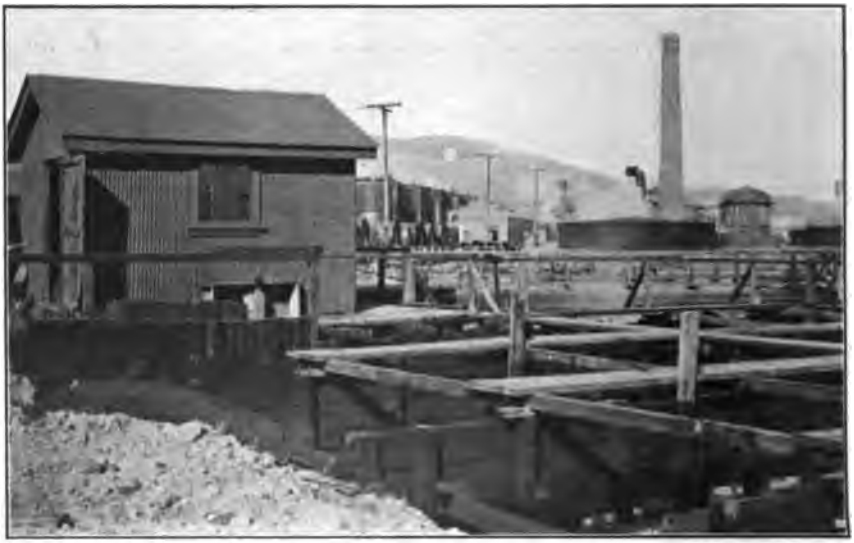


Fig. 76. Detail view of baffles of the Standard Oil Company plant at Richmond. The oil collects behind the baffles and is skimmed and pumped back into the separator. Photograph by A. M. Fairfield.

To meet this situation the Pacific Gas and Electric Company has, in the bay counties alone, spent not less than $100,000 during the last two years. The old system of settling pits, which required a large area to operate successfully, has been finally and definitely abandoned, and attention turned to newer devices. All known filters have been tried with more or less success. Straw filters were found to work very satisfactorily where the lampblack production does not exceed 5000 pounds per day, and a model filter of this type was installed in the Vallejo plant. In the larger plants this filter is too slow and expensive. A straw filter similar to the one at Vallejo, but of less capacity, is under construction at Napa.

The three best known types of mechanical filters for handling lampblack are the Oliver, the Kelley, and the Butters. All of these originally were devised for use in mining operations, but with some changes and improvements have been adapted for use with lampblack.

The Oliver filter, the most expensive and complicated, has proved the least satisfactory. One of this type is in operation at the Metropolitan plant of the Pacific Gas and Electric Company in San Francisco, and in Los Angeles, but it is unlikely that any future installations will be made.

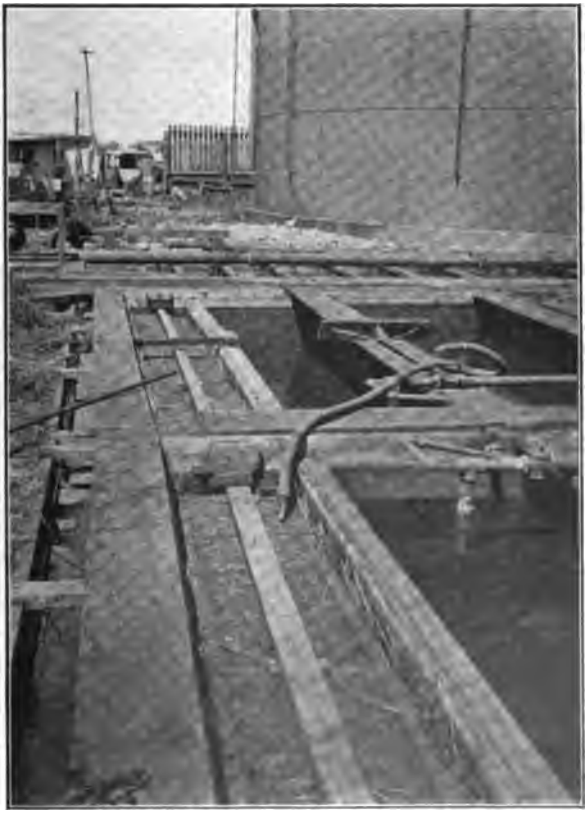


Fig. 77. Superior type of straw filter of the Pacific Gas and Electric Company at Vallejo. Photograph by A. M. Fairfield.

The Kelley filter has passed the experimental trial successfully and a battery of three of the largest size has been ordered for use at Station "B" in Oakland. The cost will be $29,100.

The Butters filter has so far proved the most effective and economical device. Its low first cost, the economy of its maintenance, and its ability to discharge water absolutely free from lampblack, added to the fact that it can be made in any size from a unit of one or two leaves up to any number needed to handle the maximum lampblack output of any plant, makes it by far the most effective and popular installation

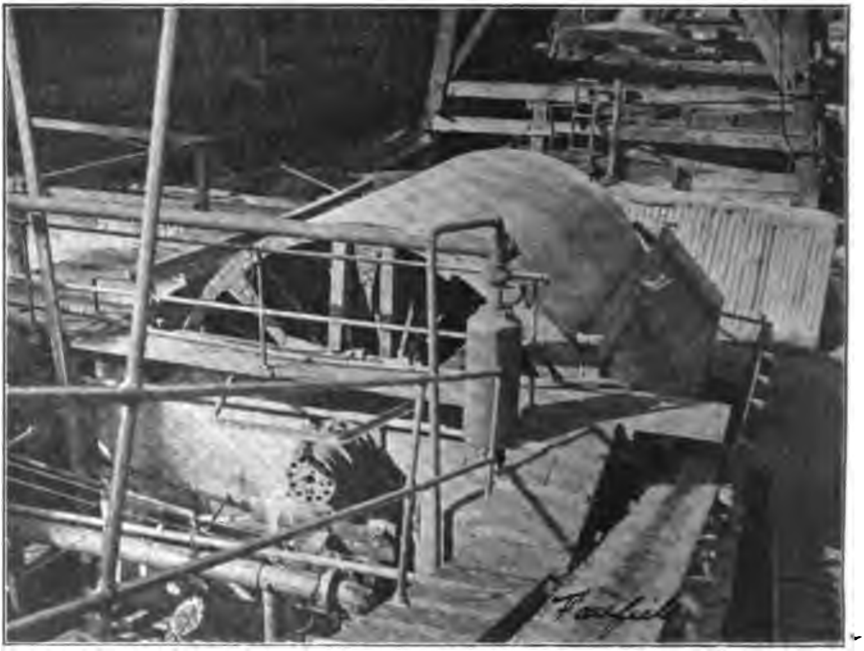


Fig. 78. Oliver filter at the Potrero plant of the Pacific Gas and Electric Company, San Francisco. Photograph by A. M. Fairfield.

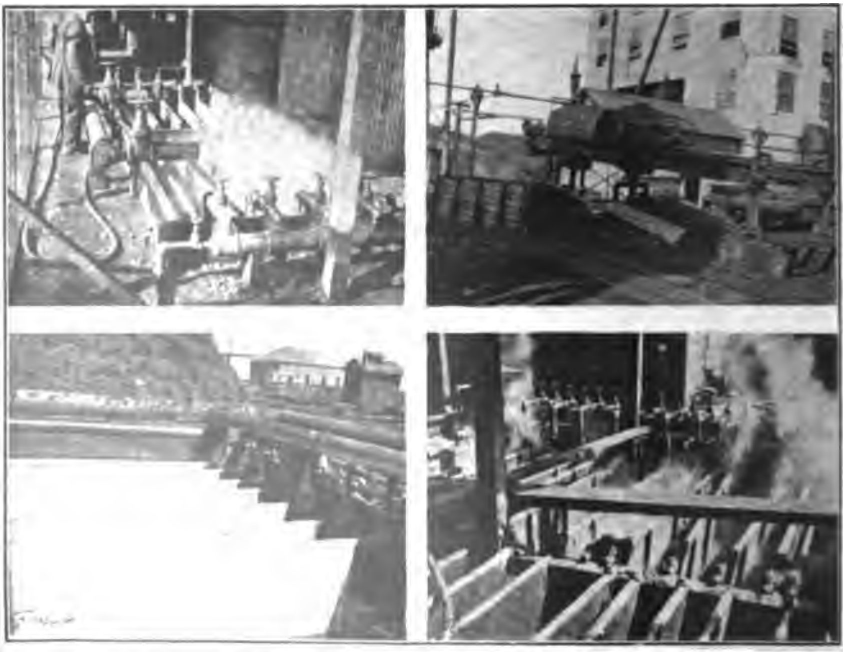


Fig. 79. Kelley filter-press of Pacific Gas and Electric Company at Oakland. Butters filter at San Jose. Butters filter, Potrero plant of Pacific Gas and Electric Company at San Francisco. Butters filter at Oakland. Photographs by A. M. Fairfield.

This type was experimented upon, some changes and improvements effected, and the perfected and model installation made by the engineers of the Oakland plant of the Pacific Gas and Electric Company. Butters filters are now in use in Oakland, San Jose, San Francisco (Potrero plant), and Santa Rosa. The Pacific Gas and Electric Company plans to install this system also at San Rafael and Vallejo, and will in time use it in all plants making 200,000 cubic feet or more of gas per day. Butters "leaves" are also being used in the dewatering box of the Oliver filter at the Metropolitan plant of the same company in San Francisco. The Western States Gas and Electric Company has been advised that an adequate filter must be installed at its Stockton plant. They will, undoubtedly, choose the Butters filter, as being the most efficient and economical.

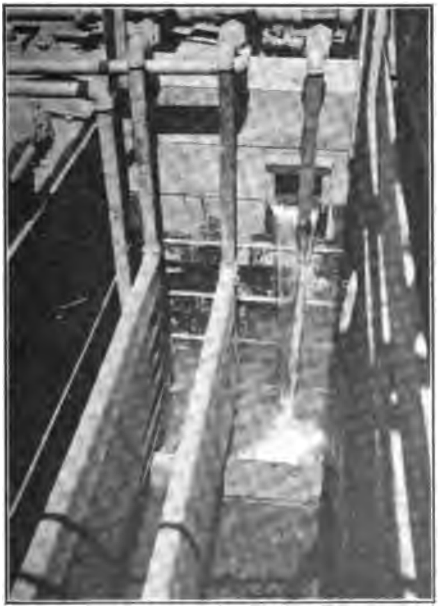


Fig. 80. Butters filter at Santa Rosa. Handles lampblack from 375,000 cubic feet of gas per day. Photograph by A. M. Fairfield.

The leakage of oil into our waters is a serious source of danger to fish, and the efforts to avoid this danger entail the expenditure of large sums annually. Oil is most frequently discharged in the waters of California because of accident, due to the breaking of pipe line, or the bursting of a hose of a tank vessel being loaded or discharged. Such accidents are deplorable and often cause great damage. When the Standard Oil Tanker Bradford went aground on the San Francisco bar it was necessary to jettison 2000 barrels of oil in order to float the ship.

The Standard Oil Company at Richmond has spent over $105,000 in the construction of separators and canals to trap waste oils and sludge. Of this amount $50,000 has been expended during the last two years. The main separator is built of concrete, is 240 feet in length, 70 feet in width, and 22 feet in depth, handling 20,000,000 gallons of water and oil daily. Fifteen men are required to attend to the separators to skim oil and handle tidal gates. The monthly pay roll of these men is $1,500. In addition to the concrete trap there are about one and one-half miles of ditches, averaging thirty feet in width, equipped with baffles to catch any oil which might not otherwise be trapped. These ditches also handle the 10,000,000 gallons of water which pass through the asphalt plant daily. All valves on oil lines on the wharf are supplied with tubs to catch the drip, and loading hoses are drained into drums. The accumulation is then pumped back into the refinery.

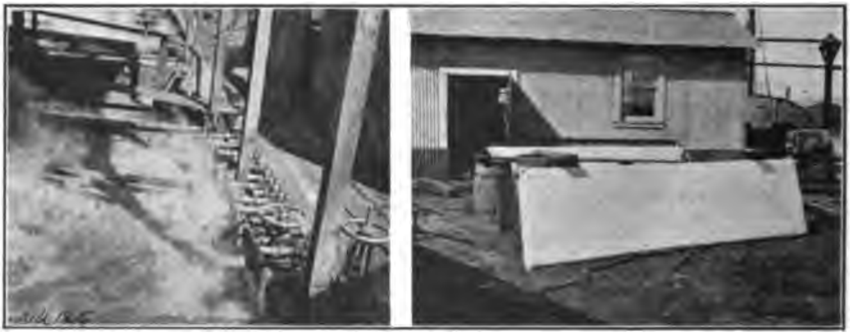


Fig. 81. Butters filter and filter leaf at plant of Pacific Gas and Electric Company at Oakland. Photograph by A. M. Fairfield.

The Union Oil Company has expended several thousand dollars in construction and repair work at the Oleum refinery, and contemplates further expenditures of some $25,000. The company plans to continue its work until satisfactory conditions are obtained.

The Shell Oil Company has built adequate oil traps at the new refinery at Martinez and no trouble from the disposal of waste oil is expected.

The Associated Oil Company has ample settling area for waste oils on its property at Avon and has experienced no difficulty in keeping such waste out of state waters. This company, as well as others, has agreed to notify the Fish and Game Commission immediately by telephone when accidents occur which result in the depositing of oil upon any waters, thus giving the commission an opportunity to make immediate investigation of the cause of such accident, and to estimate the probable damage.

The Southern Pacific Company has installed concrete traps 10 by 15 by 60 feet at San Luis Obispo, Watsonville Junction, San Jose, and San Francisco, and these are in successful operation. The San Francisco installation cost about $4,000, but we have been unable to ascertain the cost of the others. The Western Division has built two new traps in the West Oakland yards during the year past, at a cost of about $1,500, which they propose to enlarge to about four times the present area. The monthly pay roll of the trap tenders at present is $110.67.

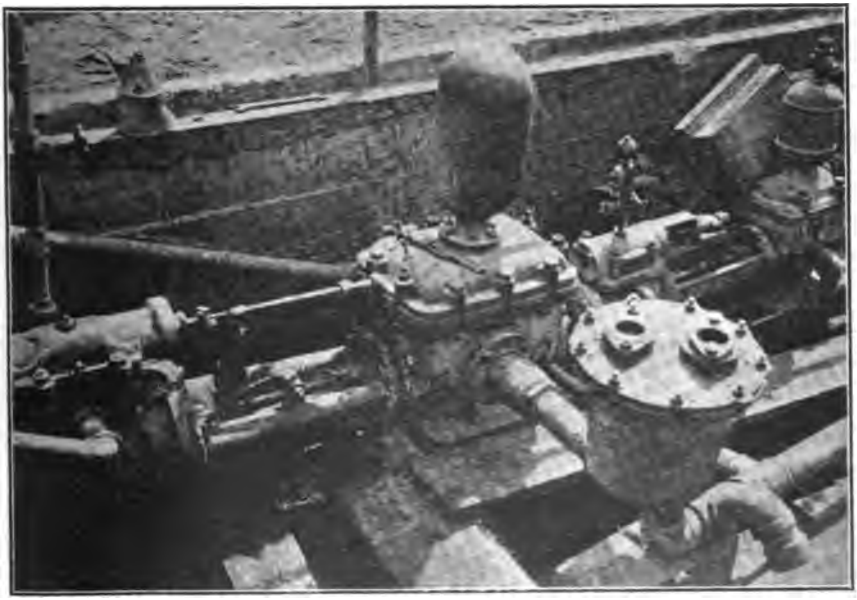


Fig. 82. Pump for waste oil recovery in oil trap of the Southern Pacific at West Oakland. Photograph by A. M. Fairfield.

Numerous analyses have been made of the discharges from the various chemical plants and the larger tanneries to determine whether or not they contain substances injurious to fish or plankton. This work has not been completed and we are not prepared, therefore, to submit a statement or opinion. Beginning July 1, 1916, the work of investigation and prevention of water pollution will be under the supervision of W. H. Shebley, Superintendent of Hatcheries, and will be handled under his direction throughout the state and without reference to districts.

Respectfully submitted.

(Signed) A. M. Fairfield,
Deputy and Assistant.

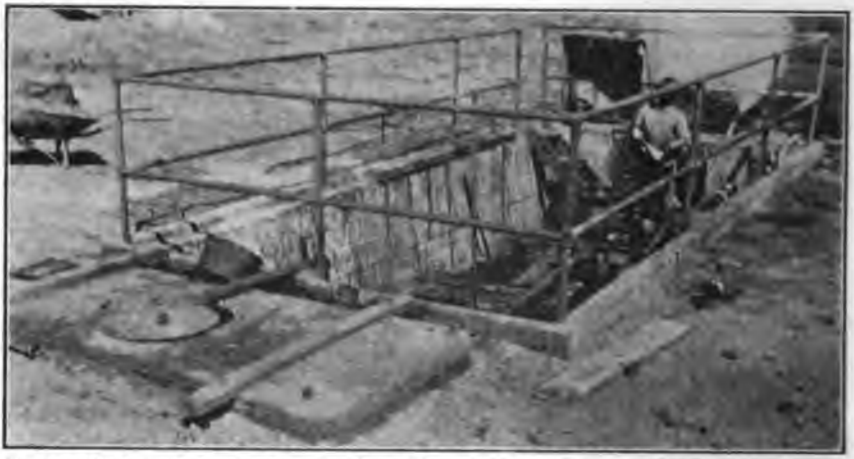


Fig. 83. Oil trap of the Southern Pacific at West Oakland. Photograph by A. M. Fairfield.

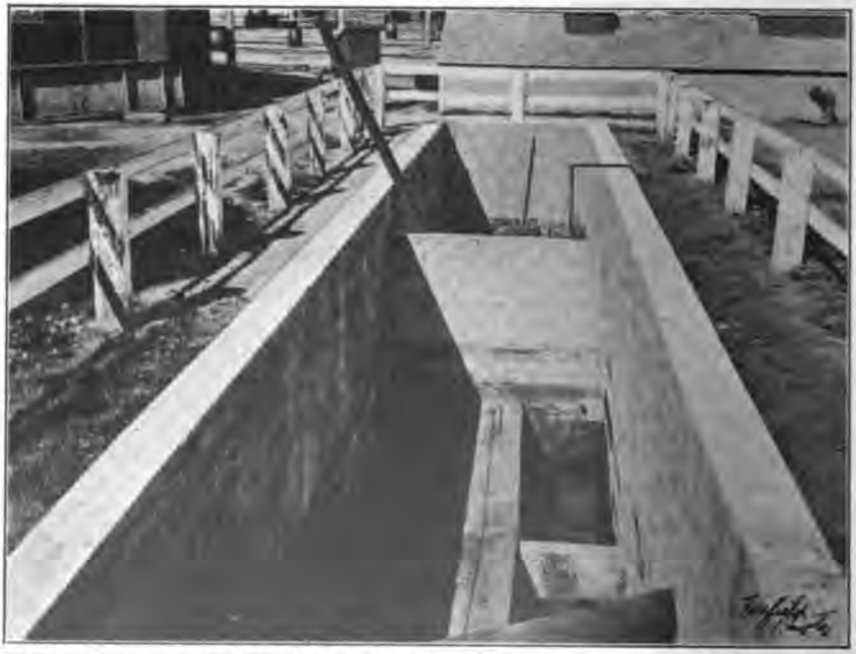


Fig. 84. Southern Pacific oil trap at San Jose, 10' x 60' x 18'. There are similar traps at San Luis Obispo, Watsonville Junction and San Francisco. Photograph by A. M. Fairfield.

REPORT OF SAN FRANCISCO DISTRICT OFFICE.

The Honorable Board of Fish and Game Commissioners:

GENTLEMEN: During the past two years fines totaling $23,785 were imposed upon 1169 violators arrested by the assistants working in the San Francisco Division. This excellent record shows well the support received from the magistrates before whom fish and game cases are tried.

For the most part, it can be said that throughout the entire division the assistants are receiving more help from people who believe in game conservation than ever before. This is because every one is beginning to realize that it is part of his duty to see that the laws made for game perpetuation are enforced and that it is up to him to assist the officers sworn to enforce the fish and game laws.

It is frequently asked why it is necessary for the commission to maintain a force of deputies in San Francisco, where there is no game. Although there is no hunting in San Francisco the results of the many violations occurring in the surrounding country are taken to San Francisco. During the past two years there were seized by the deputies in San Francisco, 4027 crabs, 6753 pounds of fish, 137 pounds of deer meat, 911 pounds of dried shrimp, and 6483 wild ducks and geese. All of this mass of fish and game had been taken or was held in violation of the law. During the same time, there were tried in the San Francisco police courts 132 game and fish cases. From this statement it will be seen by the reader that although there may be no living game in San Francisco there is a vast amount of illegal game held there during a year's time.

Game Conditions.

From the sportsman's point of view the coast region of California is particularly fortunate in having an extensive area of rough brush-covered land unsuited for agricultural purposes. On these lands the many varieties of native game have excellent cover and with the proper laws to protect and proper enforcement of these laws there will be an abundance of game for a long time to come.

There is no city of the size of San Francisco in the United States, or possibly in the world, that offers the same opportunities to the sportsman as does San Francisco. Within seventy-five miles of the thickly-settled bay region there are killed each year hundreds of deer and thousands of quail, doves, ducks and other small game. The best part of this, and the most encouraging, is the fact that under our present laws, with some slight changes, nearly all species will hold their own, if not increase.

Deer. There have never been game laws based upon more sound principles than the present acts relating to deer. The season in the coast region was changed at the last session of the legislature so that for the most part the killing of deer when the horns are in the soft velvet is prohibited.

With scarcely an exception the law giving protection to spiked bucks has been conceded by sportsmen to be one of the best that has ever been passed by our legislature. Young male deer are practically always found with the females. On account of this fact, and on account of the impossibility of telling the sexes apart, even at a short distance, it is essential that the hunter be most certain as to what he is shooting. There are, unfortunately, many careless hunters who shoot at the first sign of moving brush, with the result that frequently some other hunter is killed or dangerously wounded. This law compels the deer hunter to be certain of the character of the deer he is shooting and will, without doubt, save the lives of many of his fellow sportsmen. Reports show that the present year has been an excellent breeding season, as does with two fawns are the rule.

During the winter of 1915–1916 many deer were found dead in the northern coast counties. Investigations carried on by the commission did not reveal any new light on the cause of the deaths, but did confirm the belief that an abnormal number of internal parasites are probably largely responsible. It is possible that the deer are weakened on account of the severe winter weather and are unable to throw off the parasites. It is interesting to note that in no other part of the state has there ever been any epidemic of even minor importance among the deer. It is the intention of the commission to study these occasional epidemics and to endeavor to save the hundreds of deer that are lost each winter.

Quail. Quail have had an excellent summer. Young broods of both mountain and valley quail are seen commonly in the haunts frequented by these birds. Making the seasons during which both species can be taken the same has been of great benefit in this district. Very little complaint has been received on account of the later opening of the mountain quail season, for it is uniformly realized that the breeding season is the same and it is not right to kill the young birds before they are fully grown. Although there is a great difference in the plumage of the two species, there has been considerable confusion among hunters as to which species they were shooting. In certain instances, unintentional violations have occurred.

Waterfowl and Shore Birds. Duck shooting in the bay region was very poor during last year although there were many more ducks bred on the eastern side of the bay than usual. Shooting in all sections was below normal. Even in the San Joaquin Valley birds were not as abundant as in former years. The state law was changed at the last session of the legislature to conform with the Federal Migratory Bird Law, thus prohibiting shooting during the month of February. This, without doubt, has greatly increased the number of locally nesting ducks and will probably, during the coming fall, make good shooting in the early part of the season before the so-called "northern" birds arrive.

In the spring of 1916 there was a remarkable flight of jacksnipe in the Livermore Valley, Alameda County. Thousands of birds appeared and bag limits were the rule. In other sections this excellent game bird appeared in fair numbers. On account of the Federal Migratory Bird Law giving protection to all of the shore birds except the black-breasted and golden plover, greater and lesser yellowlegs and jacksnipe, and on account of the difficulty the average hunter has in identifying the different shore birds, it was recommended to the Department of Agriculture that all shore birds except the jacksnipe be included in the protected list. This has been done so that at present the only shore bird upon which there is an open season in California is the jacksnipe. Their open season is the same as that for ducks and geese.

Doves and Pigeons. There has been considerable increase in the number of doves on account of the delaying of the open season until September 1st. By that date most of the birds are through nesting and the young birds have reached a sufficient size so that they are able to look after themselves if the parents should be killed. It will take a number of years to bring the doves back to their former numbers, but if the present law is continued this will surely be accomplished.

Band-tailed pigeons have been reported in increasing numbers in many parts of the district and have been found nesting in sections where they were formerly not supposed to breed. The delayed protection given this species has, without doubt, added greatly to the number of birds and will mean their perpetuation as a game bird.

Introduced Game. Several years ago a small plant of wild turkeys was made in the western part of Sonoma County. It is claimed by parties living in that region that there are now several hundred birds thoroughly wild. Another plant, made in Humboldt County, is reported to have been almost as successful. If the birds in these sections continue to increase, all of the money expended by the commission in turkey experiments will have been well spent and by drawing on these regions turkeys can be secured for stocking other sections adapted to them.

Respectfully submitted.

(Signed) J. S. HUNTER,
Assistant Executive Officer.

REPORT OF SACRAMENTO DISTRICT OFFICE.

Administration.

The Honorable Board of Fish and Game Commissioners.

GENTLEMEN: In submitting a summary of the work of the Northern, or Sacramento District for the past two years, it may be pertinent to state that the district consists of twenty-three counties, as follows: Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Glenn, Lassen, Modoc, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Yolo, Yuba and a portion of Solano. Approximately 45,000 square miles of diversified territory are included, an area almost equal to that of the state of New York. The division office at Sacramento is under the able control of F. M. Newbert, for five years president of the Board of Fish and Game Commissioners. An office force of four is maintained and twenty-two deputies are under the direct supervision of this office. The location at the state capital increases the importance of the work of this district.

The district has approximately 14,500 miles of streams and about 400,000 acres of lakes, thus making it particularly rich in fishery resources. Practically all these bodies of water contain, or are capable of sustaining, edible fish life of many species. All of the large valley streams contain such choice fish as salmon, shad, black and striped bass, perch, sunfish, crappie and catfish, together with many other species, while the snow-fed mountain streams and lakes contain nearly all the known species of trout, both native and foreign. All the northern counties of the district contain game birds in abundance and possibly more waterfowl are to be found in this district than in all the rest of the state combined.

Development of Public Sentiment Favorable to Game Protection.

So successfully has public sentiment been developed that many of our people do not realize or see the necessity of a greater measure of conservation. Increased interest in the protection of fish and game has been very marked in the past few years. Residents and visitors are now beginning to realize what a great asset fish and game are to the community. In years past few arrests were made and it was almost impossible to secure a conviction by jury even in the face of strong and conclusive evidence. How different today! The commission now fearlessly submits the equity of the game laws to a judge or jury. Due to the steadily-growing belief of our best citizens that the fish and game laws are of equal value with other laws on our statute books, the commission and its officers receive the hearty cooperation of the county prosecutors and justices.

Game Refuges and Preserves.

The recently added area of a portion of the Trinity National Forest in Trinity County to the game refuges of our state is giving needed protection to many quail, grouse and other game birds and animals. Refuges are in reality natural game farms and are much better adapted to the propagation of game than all the artificial game farms taken together, for the reason that game artificially propagated and hand-fed is prone to become too confiding and when liberated falls an easy prey to both man and predatory animals. An ideal refuge for waterfowl could be established in central California, in Butte, Colusa, Sutter or Yuba counties. Such a refuge would pay 1000 per cent on the investment and insure the perpetuation of California's supply of ducks and geese and probably also the supply of many neighboring states. Unless something of this nature is done, and done soon, there will be an end to the once wonderful flight of geese and ducks through central California, for the increase of reclamation of swamp lands is destroying their breeding grounds. Very large percentages of several species of ducks nest and rear their young in the counties above named, because conditions of feed, water and safety make it to their liking. The banding together of a large number of northern California sportsmen to hold from reclamation 16,209 acres of land in Sutter, Butte and Colusa counties, is therefore to be commended. The withholding of these swamp lands also means much to the fishing industry, as the duck grounds adjacent to the Sacramento and Feather rivers are huge natural hatcheries for black and striped bass, catfish, and perch. The reclamation of these lands would mean to the ducks and shore birds what the reclamation of such lands has meant to the fish. The steady decline in the supply of many of our choicest food fishes can be laid to the reclamation of the huge inland region.

Fish Planting From Overflowed Areas.

As neither catfish, perch, black bass, crappie nor any of the sunfishes are propagated in our state hatchery at present, much of the replanting of these fish has been and must be made by saving them from overflowed areas in these districts.

In 1904 and 1905 the writer, assisted by the commission and the late Deputy Cross, stocked 318 streams and lakes with 1483 cans, or approximately 14,830 adult black bass, besides numerous other food fishes, with fish saved from overflowed areas in Sacramento, Yolo and Sutter counties. The majority of these fish were planted south of San Francisco. Further work of this character will be necessary this coming fall and winter (1916), owing to the high stage of water last season, which distributed these fish into the lowlands which later dry up.

Winter Feeding of Game.

According to statements of old residents, the winter of 1915–16 was perhaps the most severe ever experienced in the northern counties and consequently very destructive to bird and animal life, especially to mountain quail. While undoubtedly a large number of deer and mountain quail died from exposure or became the prey of predatory animals, the number reported was no doubt exaggerated. In Trinity, Modoc, Shasta, Plumas, El Dorado, Tehama, in fact, in all the mountain region, these birds were fed and cared for during the heavy snowfall last winter.

As soon as this district office was notified prompt action was taken by President Newbert to remedy the condition. Quantities of grain and hay were purchased by our deputies in the different districts. These men, being adepts in the use of snowshoes and skis, saved thousands of birds and animals by their prompt action. The small sum of $134.32 was spent by this office in the purchase of feed, but this sum does not represent the entire amount expended for this purpose. The game protective organizations in various counties acted quickly and in many instances relieved the situation before arrangements could be made by our deputies to purchase feed or reach the locality where game was in distress.

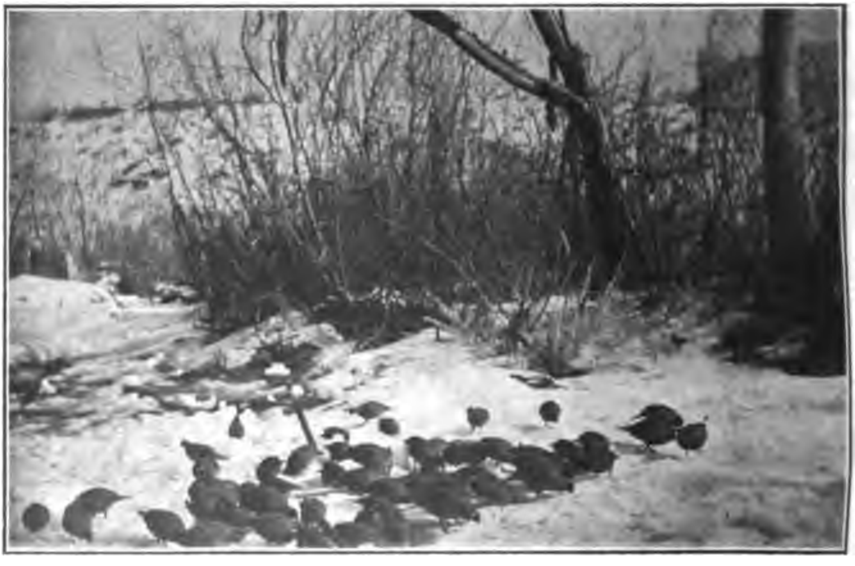


Fig. 85. Valley quail being fed during January snowstorm by Superintendent of Streets Edgar Thomas at Yreka, Siskiyou County, California.

Deputy Ray O'Connor of Nevada County fed eleven bunches of quail and many deer. Deputy Cady of Susanville fed several hundred mountain quail and deer. He also killed over forty sharp-shinned hawks which were preying on the snow-bound quail. Deputy White of Castella used a novel method of feeding quail along the Sacramento River and railroad track by making use of a hand car. He also scattered feed along the road from the rear of a railroad train. Many hundreds of quail had taken refuge along the track and on the banks of the Sacramento River. Many deer were observed swimming down the Sacramento to lower altitudes, and were later cared for by Deputy White. Deputy Warren of Plumas County, assisted by a number of residents, fed and saved a large number of quail and deer. Deputies Streuber and Harris of Siskiyou County, Laws of Trinity and Scroggs of Placer County, all reported having saved large numbers of deer, quail and other birds from starvation.

Thanks are due a large number of residents who, without stinting, fed large quantities of hay and grain to starving game birds and animals and without charge to the state. A. C. Sprout of Copco, on the Klamath, is reported to have fed 300 deer that came to feed with his cattle. Judge Dockery of Hayfork fed forty deer. A. G. Guthrie of Pittville fed seventy mountain quail. L. Albey fed 400 quail near Etna. Edgar Thomas of Yreka cared for a large covey of quail almost in the heart of the city. Dr. Edgecomb of Knob fed several bands of quail. Dr. Tinsman of Adin was very energetic in rendering assistance, together with J. W. Jamison of Dutch Flat. This display of cooperation is gratifying to the commission and to everyone interested in our wild life resources.

Late reports from our deputies advise us that deer, in the northern counties of this district, are plentiful.

A line of game perpetuation endeavor which annually is increasing in scope is the heavy planting of trout fry in the numerous streams and lakes of this district, thereby not only taking cognizance of the demands of the sportsmen of the state, but also of the public demand for edible fish.

Northern California is now the mecca of sportsmen from all over the United States. These sportsmen are as keen, if not keener, in their appreciation of the scenic, climatic and outdoor life attributes of this section of the state than even the residents themselves. Through constant and consistent endeavor on the part of the Game Commission the old evils which confronted the sportsman and game lover are being eradicated rapidly and an appreciation of what game conservation and law observance means is restoring the depleted streams and game covers.

Respectfully submitted.

(Signed) GEORGE NEALE,
Assistant in charge Sacramento District Office.

REPORT OF THE LOS ANGELES DISTRICT OFFICE.

The Honorable Board of Fish and Game Commissioners
of the State of California.

GENTLEMEN: Fish and game work bore better fruit in southern California during the last two years than in all previous experience of the organized efforts whose prime object has been to provide better sport for the licensees whose dollars finance the commission charged with this great public service.

"Nothing succeeds like success"; and sentiment today stands just as squarely behind conservation in southern California as it does in the eastern centers of radicalism, where some have weaned themselves away from the practical aspects of the problem to chase the chimera of sentiment. In this state, the close relation between their Fish and Game Commission and the sportsmen has made the work one of providing more fish to catch and more game to shoot. The most valuable sentiment revolves around sporting rather than around the ultra-æsthetic, the end and aim of which is to set the gun in its rack and the rod in its corner for all time. Too vast an "allied industry" has developed about California fish and game to suffer such a loss, not to mention the plain and direct attraction value it has demonstrated in encouraging men of means to make this commonwealth their home.

The sportsmen of southern California under the present administration of their affairs have seen their fish and game grow with the increases of the field-patrol force. In 1915, they enjoyed the best fishing and the most diversified sport with the rod that has ever been their good fortune. Rainbow trout of large size had grown from Fish and Game Commission plantings in the artificially created mountain reservoir lakes until an entirely new sport had been developed. So likewise with the gamy and toothsome importation from the East, the black bass. Meanwhile, every native form of fishing showed marked improvement. Stream fishing was phenomenally good when the increased number of angling licensees is considered. Hunters enjoyed the best quail shooting in a decade during the extended season wherein the commission vindicated its promise to recommend a longer shooting period as soon as quail increased sufficiently to permit it. Duck-shooting on the clubs was good all through the winter; doves gave excellent sport in September, and the deer crop in some of the counties was the heaviest in several years, Santa Barbara notably reporting a killing double that of the year before.

All these good things came in conjunction with the most business-like and vigorous campaign in behalf of fish and game conservation that it ever has been financially possible to make in southern California, Commissioner Connell having announced that the income of the work seemed to have attained sound enough foundation to warrant establishment of a big hatchery to anticipate demands of the future, and broadening of the field-patrol activities by appointment of deputies in every county. The effect of these changes of policy was so immediate and so palpable that credit was freely given to conservation for the results attained. So today, sportsmen in the south stand squarely behind the plan, and violators find themselves arrayed against a quiet but determined public sentiment which shows in numerous prosecutions and stiff fines to chronic violators. Favorable breeding seasons played a strong part in bringing about better game conditions; but no breeding season is favorable unless the gun be kept from the fields. It may now be said that a breeding stock of game has been developed which, with the care it is sure to receive, can weather any demands likely to be made upon it under the law even by the expected increase in the army of hunting licensees taking advantage of it each year. The supply is here; regulating the annual drain to the annual increase is now the problem.

Fish propagation work in the south has been more a matter of distribution than of rearing, but Bear Valley Hatchery has had two good years, albeit expensive in unit cost per thousand of product as judged by the state standard for fishcultural efforts. The May first trout-opening was one of the wisest laws ever passed to benefit fishing in the south. It already has justified the delay on Bear Lake alone. The value of protecting "spawners" through April is no longer questioned even by those who at first fought it bitterly there.

In the game fields, aided by the delayed opening of the rabbit season, the potential presence of deputies has resulted in the best two summers the breeding birds have ever enjoyed. The rabbit law was not so much intended to protect rabbits, which are a pest, as it was to deprive the violator of any legal color of right to be afield with a gun in the nesting season. That it has done, and to it in great measure may the present heavy head of quail and doves be credited. Considerable of the opposition to the rabbit protective measures has died out among large ranchers who undeniably do suffer sorely from the depredations of these animals, entirely because these men of broad vision have themselves seen the benefits of excluding the fire-starting, fence-cutting type of violator from their lands by removing from him the chance to cover his depredation by the excuse of benefiting them through decreasing their rabbits. Many a ranch owner wishes to give the true sportsman every opportunity to enjoy his game; and some are learning that between the sportsman and the summer violator lies a gulf like the sea. For he who respects not the law of the state will not respect the rights of his fellowman, and he it is who usually is careless with all other of the relations of life. Possibly nowhere in the state has the value of the absolute closure of all shooting in summer been so plainly demonstrated as in southern California. Now the man who shoots announces himself as violating the law—a "poacher upon the public"—and blazes the trail to justice.

The rabbit law, like the late trout-opening, has put in the hands of the patrol force a practical power of enforcement equal to trebling its numbers, and is therefore a state asset of at least triple the present pay roll every month. What its incidental benefits in building up a more attractive game supply may be, only the future growth of the state through these most potent inducements can tell. Experience has proved that the love of the rod and gun lies deep in most normal men; and that, other things approximately equal, the majority will cast their lot where they may cast their line with alluring chance of success; will risk getting their gains where they stand chance of getting their game with it. This is not theory, but the most practical reasoning in the world.

Few realize the value of good shooting and fishing as an inducement to tourists and home seekers to come this way; but in the South, world-famed as the playground of men of means, whatever adds to the joy of life by luring to the outdoors must be even more important than elsewhere. Nor is the value solely that of an attraction. In these days of preparedness, who can say how essential may prove these rugged sports which make men of boys by taking the youth of the land away from saloons, pool-rooms and low city company to healthful hills, building strength, self-reliance, character that may one day stand between the nation and its fate?

Realizing the attraction power of the deer interest, the Southern Division under Commissioner Connell's orders, set about making of 1916 a grand "clean-up" of chronic violators whose proclivities for more or less systematic stealing of sport from the law-abiding by "soonering" ahead of the legal opening date, have been under espionage for some time. Backed by repeated information from staunch friends of law and order, the commission was able to accumulate the necessary evidence to run to earth and convict no less than ten confirmed offenders of this class to the great delight of those whose sport in years past had suffered from such marauders. Late in July, Deputy Becker, after a hard chase through the most inaccessible portions of the rugged, craggy Malibu range, known as the "Happy Hunting Ground" of the moderate-circumstanced, short-timed Los Angeles deer seeker, brought to justice Charles Decker and his followers, who were fined. Decker admitted upon the stand the killing of hundreds of deer at all seasons. A few days later, Deputy Barnett succeeded in catching and convicting two hardened offenders; one of them, Byron Secor, had made a business of violating by shipping and selling venison illegally killed. Earlier, Becker uncovered the evidence upon which he convicted Tony Ferriera of killing a deer many months previous, in a forest reserve. All told, 1916 was a bad year for the deer crooks, and did more to put the protection of deer upon a solid footing in the south than all past time combined.

Arrests and convictions for infractions of the quail and dove laws have been weekly occurrences, mostly small matters wherein a motorist had knocked over a quail or two along the road, or "potted" a few doves from posts or wires, unable to withstand the temptation, which is always safely met by leaving the gun at home. The day when men will set forth to make a bag in the closed season is past in southern California. It has become not only an expensive but also a most unpopular practice.

At the opening of the trout season, Commissioner Connell made use of the emergency appointment provisions of civil service to extend the patrol force to such proportions that three dozen competent wardens were keeping an eye open along streams and lakes, camps being established at centers of angling interest such as Bear Valley and Little Bear, under the direction of veteran patrol officers, and the fish were given every possible opportunity to cast their spawn in peace during April. Already the effects are being seen along streams as well as in the lakes. The torrential storms of January washed so severely many of the gorge streams that only extraordinary measures could have built up a breeding stock from the remnant left; but there is reason to believe that when supplemented with the outcome of last fall's plantings, this task has been accomplished.

Although commercial fisheries conservation is public service work of the very broadest character, and there is some moral question as to the right of the Fish and Game Commission to divert the moneys collected from hunters and fishermen to this service, the commercial fishermen have themselves contributed in excess of $10,000 in license fees this year, not to mention quite a sum collected in fines from convicted offenders, and in this way have built up a fund which will finance considerable work in the public behalf. Owing to poor advice, some of the ignorant aliens refused to take license, and it became necessary for the sea-patrol under Deputies Pritchard, Nidever and Barnett to make a grand "clean-up" during June which resulted in no less than forty-six arrests and nearly as many convictions. The licensees found that fishing privileges come cheaper from the commission than from justices of the peace. The Japanese gave no trouble whatever, taking license en masse through the secretary of their association, and to their credit may it be said that they respect the laws even better than the American citizens, once the laws are grasped and understood by their head men.

Acting upon complaints from the Tuna Club regarding violations of the closed "District No. 20" comprising the state waters surrounding Santa Catalina Island, the sea-patrol has maintained surveillance

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thereupon at every opportunity, and a special arrangement was entered into whereby a resident deputy was commissioned to expedite enforcement of the laws designed to protect the sporting fishing thereabouts, which has been a peculiar and unique asset of southern California, with its opportunity to catch the great tuna, the gamier swordfish of both species, the heavier black sea bass, and numerous smaller kinds.

Laws passed to protect the angling along the seashore by prohibiting the netting or sale of the characteristic game fishes of the littoral have been enforced against several professional seiners whose gear was confiscated and sold, justice being tempered with mercy in all cases but those wherein wilful and repeated violation was proved. The patrol work incidental to enforcing these laws has been financed by the collection of angling licenses from surf fishermen, who are numerous and ever-growing in southern California and who show a sportsmanlike disposition to pay a fair proportion of the expense necessary to protect their favorite varieties.

Beside the immediate features of enforcement work, numerous investigations have been carried forward by experts in the employ of the commission. The activities of kelp harvesters, prospect of successful acclimatization of striped bass in the lagoons of the south, angling and life conditions in Bear Lake, and shellfish are a few of the matters covered. The tuna packing industry, which has become the largest individual feature of the fish trade in California, surpassing even the salmon industry in whose development a lifetime and enormous sums have been spent, has had the benefit of the commission's fisheries experts who studied the habits and wanderings of the albacore, commonly canned as tuna. Ten years ago a waste product, this "chicken of the sea" is now familiar to nearly every family, and its development into a state resource has cost California not a penny other than the penalty of years of profit lost through not knowing its sterling value earlier.

Fish and game may now be said to stand upon a substantial footing in the south, financially, physically and morally. With the most up-to-date hatchery in the world nearing completion on the eastern slope of the Sierras ready to begin work on next spring's eggs, there is reason to believe all freshwater fish conditions will steadily improve. The steady growth in license income took a sudden and most noteworthy spring this summer, until it would be a bold man indeed who would attempt to predict its total ten years hence; but so long as every unit-increase in the demand brings with it another dollar to defray the cost of additional sport demanded, just so long will that increase be denied any terrors for those whose hope and best wish is ever "more fish to catch, more game to shoot" for all Californians.

Respectfully submitted.

(Signed) EDWIN L. HEDDERLY,
Assistant.

REPORT OF FRESNO DISTRICT OFFICE.

The Honorable Board of Fish and Game Commissioners.

GENTLEMEN: The year 1915 witnessed little change in general conditions with regard to fish and game in the Fresno Division. The policy of the office continued to be along the same lines as in previous years. The office was a central point from which the activities of the deputies were directed and at the same time it was recognized by the public as a friendly cooperative agency alike for the diffusion of information regarding fish and game laws and the aims and ideals of the Fish and Game Commission as well as a receiving point for information from the public on all subjects pertaining to the betterment of conditions with regard to fish and game law enforcement. The active cooperation and confidence of the public throughout the nine counties of the Fresno Division has been the best justification for the establishment of the Fresno office in the first instance.

In the winter months of 1914–15 a determined effort was made to correct conditions existing around the westerly and southerly boundaries of Yosemite National Park. Many deer in previous years have been slaughtered at the time when the snows drive the deer from the protected area of this National Park. By hard and patient work the Fresno office had finally reduced to a minimum, offenses against the deer law in the counties of Kern, Tulare, Fresno and Madera. In former years, large numbers of deer were slaughtered when in a comparatively helpless state in the foothill and lower mountain region. Naturally, the most important feature of protective work for the deer was in securing the cooperation of the mountain people. Although at first antagonistic because the mountaineers had always made a practice of killing deer for the meat, when needed, a condition was brought about gradually whereby in the mountains mentioned the Fish and Game Commission had the almost unanimous support of all the mountain people. The only remaining section of the Fresno Division where the enforcement of the deer law and the sentiment therefor was not general, was that section of the mountains lying as described, just outside of Yosemite National Park. Three picked deputies were sent into the region and remained there throughout the winter months. From all evidence that can be gathered there were practically no deer killed in that section during the past winter. However, the work of the deputies must be followed up for several successive seasons in order to make these improved conditions effective and enduring.

The fish planting operations in the Sierra Nevada Mountains of the Fresno Division have been consistently carried forward and in 1914 the pack horse distribution work reached its climax of magnitude. This work of stocking the barren streams of a vast region with desirable varieties of trout has been of great value and of universal popularity with the public. It should be noted that some experiments of much scientific value have been undertaken which give promise of interesting results. Waters uninhabited by fish have been available for such experiments. Conditions have been favorable for testing the development of steelhead trout fry when planted in waters where the fish can not readily run to the ocean. Other experiments along similar lines to observe what changes, if any, take place in the apparent characteristics of golden trout have been undertaken and these experiments, as well as the steelhead experiment, have been the subject of previous biennial reports from the Fresno office. The time to draw conclusions from these experiments should be ripe in the summer seasons of 1916 and 1917.

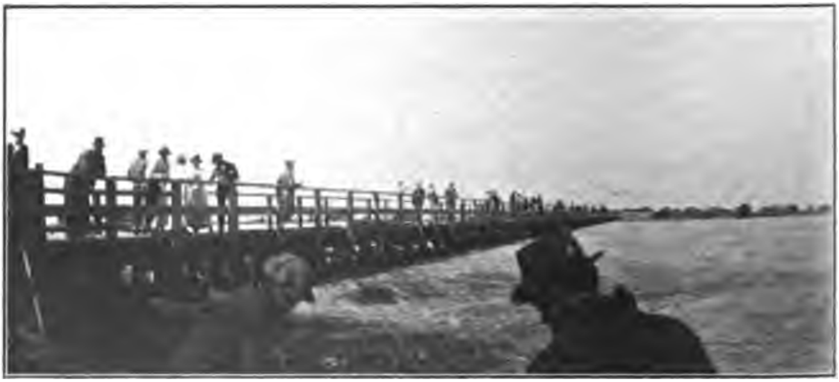

Fig. 86. Fishing for salmon with hook and line on the San Joaquin River at the Miller and Lux weir at Mendota, Fresno County. Photograph by A. D. Ferguson.

The following copies of reports cover the fish planting enterprises of the Fresno office during the seasons 1914 and 1915.

Report Trout Planting 1914.

By reason of the magnitude of the operations, the distances over which the fish were transported and the fact that golden trout alone were used in the transplanting operations, the fish planting by the Fresno office in the summer months of 1914, was the most important undertaking ever inaugurated by that office.

On July 1, 1914, Deputy Ellis left Fresno with a finely equipped pack train of twenty mules, of which fourteen carried fish cans and six carried provisions and horse feed. The fish planting crew consisted of Deputies Ellis, Brownlow, Bullard and Smalley. Later Messrs. Walter Williams, Ray C. Ellis and Tom P. Ferguson were engaged as assistants in connection with the expedition. Mr. D. A. Williams, a well known business man of Fresno, fell in with the expedition at

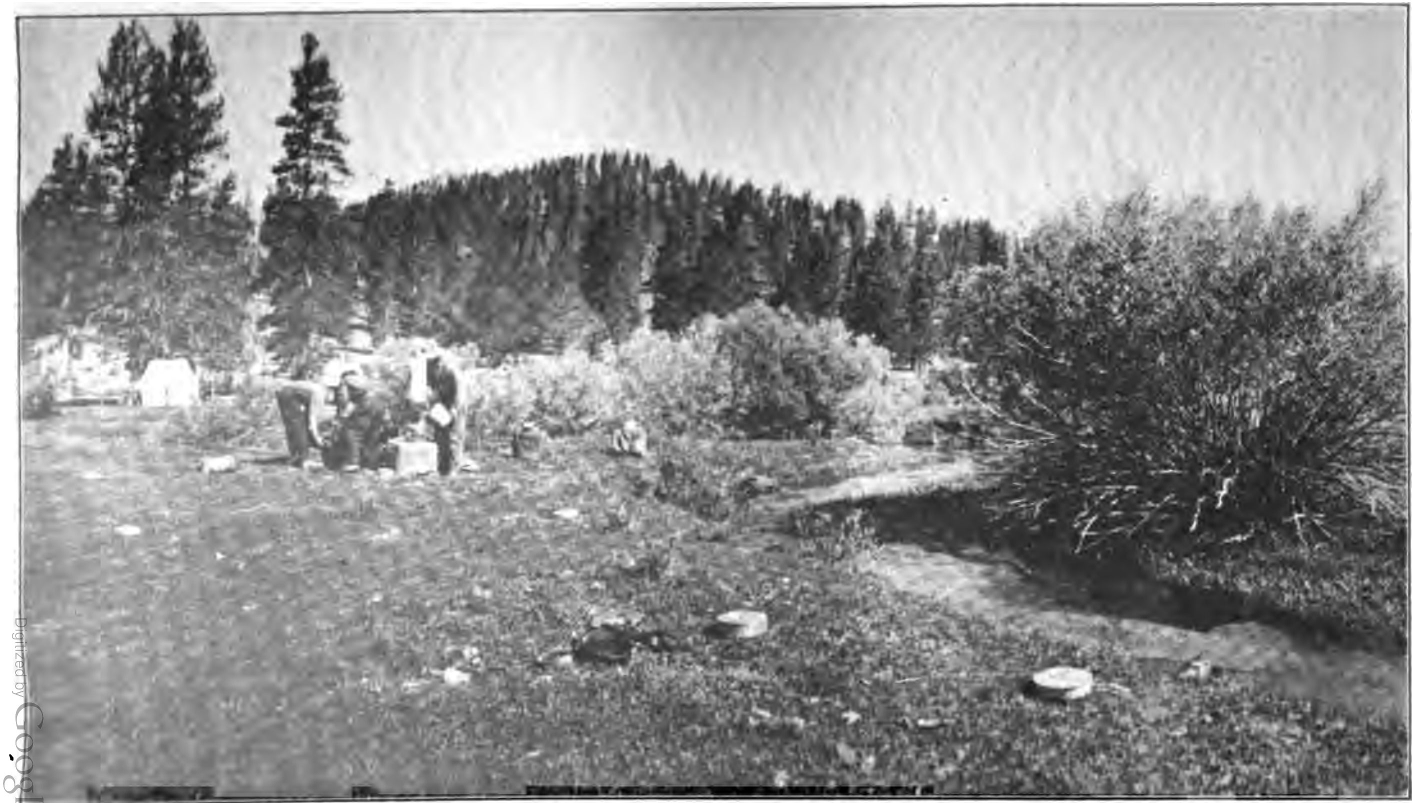

Fig. 87. Golden trout operations. Sorting the fish at Long Meadows preparatory to a pack-horse trip. Photograph by A. D. Ferguson.

Whitney Meadows and donated his volunteer services to assist in taking up fish and in the fish planting operations.

The pack train proceeded to Whitney Meadows and there took up some 2000 adult golden trout. The fish planters then proceeded by trail to Lone Pine, which consumed two days, and thence to Bishop and North Lake, which took four days. While encountering many difficulties, they succeeded in landing the major portion of the fish at a comparatively high altitude at North Lake; where the danger of losses was over. At North Lake the expedition was joined by Paul G. Reddington, forest supervisor of the Sierra National Forest, and A. D. Ferguson, in charge Fresno Division. From North Lake the fourteen mule loads of golden trout were taken across the summit via Piute Pass, crossing on 60 feet of snow, and on to the headwaters of the south fork of the San Joaquin River.

This consignment of fish was planted in the following waters:

Desolation Lake, two unnamed lakes on the south side of Piute Creek, French Canyon Creek, and Piute Creek. Distant two days pack from these localities, plants were made in Heart Lake and Marie Lake, tributary to the south fork of the San Joaquin, and in the headwaters of Bear Creek which is an important tributary of the south fork of the San Joaquin.

Immediately after delivering the golden trout on the headwaters of Piute Creek, Deputy Ellis, accompanied by Ray Ellis and Tom Ferguson, returned with half the pack train to Whitney Meadows for a new supply of golden trout for transplanting, while Deputies Bullard and Brownlow, after stocking Bear Creek and lake waters, took the remaining half of the pack train, by trail, to Mammoth where they awaited a consignment of golden trout which Deputy Ellis was in the meantime gathering at Whitney Meadows. About August 2d, Deputy Ellis and his assistants carried seven mule loads (14 cans) of adult golden trout down to Lone Pine and thence by auto truck to Mammoth, where they were delivered to Deputies Bullard and Brownlow, the former deputies returning at once to Whitney Meadows to secure a further supply. This consignment of fish was planted by Deputies Bullard and Brownlow in the creek at Agnew Meadows, in Shadow Creek, Garnet Lake and Shadow Lake. It had been previously arranged between the Fresno office and the superintendent of Yosemite National Park, that five mule loads of this consignment of golden trout were to be delivered to the park authorities at Thousand Island Lake. Upon arriving at Thousand Island Lake, the deputies of the Fish and Game Commission found evidence that the park pack train had been there but had returned to the park. Accordingly, all of the fish were distributed in waters immediately south of the park line.

By the foregoing operations the range of the golden trout has been extended more than 150 miles along the summit waters of the Sierras from Volcano Creek, the original habitat.

On August 10, 1914, Commissioner Carl Westerfeld and A. D. Ferguson, in charge of the Fresno office, accompanied by Robert Duke, attorney for the commission, joined the pack train at Lone Pine and were with the crew throughout the remainder of the time the expedition was in the field. Deputy Smalley was, because of severe illness, compelled to return home from Bishop, leaving the pack-train crew while on its first trip. From Whitney Meadows as a base of supply, seven plants of golden trout were made in new waters tributary to the upper Big Kern and in small lakes in the vicinity of Mount Genoa and Crag Erricson. An additional plant also was made to the former plant in Lake South American. Commissioner Westerfeld assisted throughout this and subsequent operations not only in taking up the golden trout but in distributing them.

Deputies Bullard and Brownlow having now returned with their string of pack stock to Whitney Meadows, a full pack-train load of golden trout were taken up and the expedition proceeded via Kern River Canyon, Farewell Gap, Mineral King, Timber Gap, Elizabeth Pass, Roaring River, Kings River Canyon and on to the northern slope of the divide between Middle and South Forks of Kings River. En route plants were made in Cliff Creek, tributary to the Kaweah River and Lone Pine Meadow and Tamarack Lake (renamed Lake Westerfeld) on the headwaters of the middle fork of the Kaweah. The party divided at Roaring River. Deputy Bullard, assisted by Walter Williams, with four mule loads of golden trout, completed the season's operations by planting Horse Corral Creek, Lewis Creek and Wildman Creek, tributaries of the south fork of Kings River, and Kennedy Creek with its tributary lakes, and a lake at the head of Lost Canyon, tributary to middle fork of Kings River, situated on the north side of the Monarch Divide which separates the middle and south forks of the river. The expedition was disbanded at Big Meadows in northern Tulare County.

About 5000 adult golden trout were transplanted, all taken with (fly) hook and line. All of the plants were made in ideal barren waters which are located conveniently for further distribution work in still other barren waters as soon as the fish shall have become established. Because of these and previous similar operations in transplanting golden trout, the fear once common that this peerless species might become extinct, is forever allayed.

Late in September a carload of rainbow, eastern brook and Loch Leven trout fry were planted at Huntington Lake.

Report Trout Planting 1915.

The fish planting operations of the Fresno office during the 1915 season were confined to extending to new waters in the same general locality the plants formerly made in an important part of eastern Fresno County.

In the month of August, with a ten-mule pack train, Deputies A. D. Ferguson, in charge of Fresno Division, S. L. N. Ellis and F. A. Bullard proceeded to Dinkey Lake to complete some transplanting work first undertaken in that vicinity several years ago. The expedition was accompanied by Hon. L. B. Cary, chairman of the House Committee on Fish and Game in the legislature of 1915. Mr. Cary was given an opportunity to observe the methods of the Fish and Game Commission in establishing trout in available waters which had been theretofore barren. With rainbow trout and black-spotted trout secured from Psalter Creek, plants were made as follows: In the creek which heads on the divide west of "Mining Town," the streams which feed from various directions, Dinkey Creek, the upper main Dinkey Creek, the stream which comes from Cutts Meadow and the streams which are crossed by the trail from Cutts Meadow to Mining Town; all being tributary to Dinkey Creek.

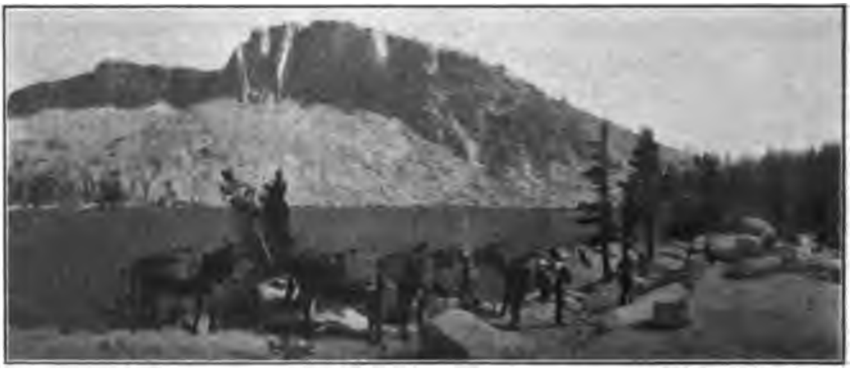

Fig. 88. Deputies of the Fresno Division do fish planting along with patrol duty. Note the cans of fish on mule-back. Photograph by A. D. Ferguson.

Thereafter, with eastern brook trout secured at Dinkey Meadows, where they were planted by Deputy Kenneth Hughes in 1910, the upper waters of the main fork of Dinkey Creek were well stocked.

After finishing the stocking of all the main tributaries of Dinkey Creek, the fish planting operations were transferred to the north fork of Kings River. At upper Maxon's Meadow a plentiful supply of rainbow trout were found, being the result of a plant made in 1910. Drawing on this supply and using fish from 8 to 14 inches in length, the following barren waters were stocked: The lake known as The Devil's Punch Bowl, the south fork of Fleming Creek and two small lakes tributary to said creek, Fall Creek and Baird Creek. Plants were later made in the extreme head of the north fork of Kings River.

After completing these operations the activities of the fish planters were transferred to the vicinity of Helm Creek, stocked in 1910 with eastern brook trout. The creek was found to be alive with these trout. Here adult fish were taken to stock various lakes in that vicinity. That some idea may be gained of the results which follow fish planting in barren waters in the Sierra Nevada Mountains, attention is called to the fact that Deputy Bullard, fishing with "flies," took 110 eastern brook trout from Helm Creek within thirty minutes. These fish were afterwards planted, uninjured, in new waters in that vicinity. Nelson Lake and five other barren lakes tributary to Helm Creek, were also stocked with adult eastern brook trout, this completing the transplanting operations with adult fish.

In September, 26,000 rainbow fry from the Sisson Hatchery were planted by deputies of the Fresno office in the north fork of the San Joaquin River. These fish were taken to the terminus of the wagon road at Bass Lake and thence by pack train to the waters to be stocked.

A carload (100 cans) of rainbow and Loch Leven fry from the Sisson Hatchery, were distributed late in September in Huntington Lake and various streams tributary to Huntington Lake and to Shaver Lake, all being in the mountains of eastern Fresno County.

The Fresno office of the Fish and Game Commission was closed March 1, 1916.

Respectfully submitted.

(Signed) A. D. FERGUSON,
Assistant in Charge Fresno District Office.

APPENDIX

CALIFORNIA FISH AND GAME COMMISSION, ADMINISTRATIVE DISTRICTS.

San Francisco District.

Office: 425 New Call Building, San Francisco.
Phone, Sutter 6100.

Alameda County.
Contra Costa County.
Del Norte County.
Fresno County.
Humboldt County.
Kings County.
Lake County.
Madera County.
Marin County.
Mariposa County.
Mendocino County.
Merced County.
Monterey County.
Napa County.
San Benito County.
San Francisco County.
San Mateo County.
Santa Clara County.
Santa Cruz County.
Sonoma County.
Solano County.
Stanislaus County.
Tuolumne County.
Tulare County.

Sacramento District.

Office: Forum Building, Sacramento.
Phone, Main 4300.

Alpine County.
Amador County.
Butte County.
Calaveras County.
Colusa County.
Eldorado County.
Glenn County.
Lassen County.
Modoc County.
Nevada County.
Placer County.
Plumas County.
Sacramento County.
San Joaquin County.
Shasta County.
Sierra County.
Siskiyou County.
Sutter County.
Tehama County.
Trinity County.
Yuba County.
Yolo County.

Los Angeles District.

Office: 426 Union League Building, Los Angeles.
Phones: Broadway, 1155; Home, F5705.

Imperial County.
Inyo County.
Kern County.
Los Angeles County.
Mono County.
Orange County.
Riverside County.
San Bernardino County.
San Diego County.
San Luis Obispo County.
Santa Barbara County.
Ventura County.

BOARD OF FISH AND GAME COMMISSIONERS.

Roster June 30, 1916.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of the Governor. No compensation.

F. M. Newbert, *President*, Sacramento	Appointed August 3, 1911
M. J. Connell, Los Angeles	Appointed February 1, 1909
Carl Westerfeld, San Francisco	Appointed November 28, 1911
Ernest Schaeffle, *Executive Officer*, San Francisco	First appointed Assistant March 29, 1905. Appointed Executive Officer November 29, 1911.

Head office, San Francisco, 425 Call Building.†

Under direction of Commissioner Carl Westerfeld.

	Date first appointed
Ernest Schaeffle, Executive Officer	March 29, 1905
J. S. Hunter, Assistant Executive Officer	December 1, 1907
A. D. Ferguson, Field Agent	May 1, 1909
R. D. Duke, Attorney	February 6, 1912
John P. Fisher, Chief of License Bureau	May 1, 1915
Daniel O'Connell, Clerk, License Bureau	December 9, 1911
E. C. Boucher, Special Agent	October 1, 1914
O. H. Reichling, Cashier and Bookkeeper	March 26, 1908
H. R. Dunbar, Assistant Cashier and Bookkeeper	December 16, 1912
Leo N. Pettit,* Chief Clerk	May 1, 1901
Mae D. Horn, Stenographer	July 23, 1907
Lida H. Ransom, Stenographer	October 1, 1911

Fishcultural Department.

Hatcheries—Screen and Ladder Investigations—Water Pollution.

W. H. Shebley, In Charge, San Francisco	May 16, 1883
E. W. Hunt, Field Agent, San Francisco	August 10, 1887
G. H. Lambson, Superintendent, Sisson Hatchery	March 1, 1916
F. A. Shebley,* Superintendent, Ukiah and Snow Mt. Hatchery	November 1, 1893
W. O. Fassett,* Superintendent, Ft. Seward Hatchery	April 1, 1896
A. E. Doney, Screen and Ladder Surveyor, San Francisco	March 1, 1905
A. E. Culver, Screen Surveyor, San Francisco	July 1, 1913
A. M. Fairfield,* Water Pollution, San Francisco	August 11, 1906
J. H. Hoerl, Chief Clerk, San Francisco	March 1, 1908
Lillian Ciegler, Stenographer, San Francisco	May 1, 1914
R. W. Requa* (on furlough), Assistant Superintendent, Chico	June 18, 1895

Sisson Hatchery—Sisson.

E. Clessens, Fourth Class Fish Culturist	February 1, 1913
F. Clessens, Carpenter	April 1, 1908
R. Elkins, Temporary Employee	January 17, 1914
A. Hill, Temporary Employee	April 2, 1914
Wm. Heffernan, Watchman	June 7, 1912
G. McCloud, Jr., Fourth Class Fish Culturist	February 9, 1914
J. McManus, Temporary Employee	October 19, 1914
C. Nixon, Third Class Fish Culturist	March 1, 1910
R. A. Pape, Temporary Employee	April 9, 1915
R. Rupp, Pond Watchman	January 1, 1911
J. Sollner, Fourth Class Fish Culturist	July 5, 1913
F. Sullaway, Foreman	October 1, 1911
J. E. Winchcomb, Pond Fish Feeder	August 1, 1911

Distribution Cars.

L. Phillips, Superintendent Car No. 1	January 1, 1912
R. W. Flint, Temporary Employee	April 15, 1916
G. McCloud, Sr., Fourth Class Fish Culturist	July 1, 1913
F. L. Raycraft, Temporary Employee	March 29, 1916
R. I. Bassler, Superintendent Car No. 2	January 1, 1912
A. Mack, Temporary Employee	December 27, 1915
W. H. Pepper,* Temporary Employee	May 16, 1904

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*Employment not continuous.

†February 1, 1916, San Francisco and Fresno districts were consolidated.

Ukiah and Snow Mountain Hatcheries.

	Date first appointed
J. Shebley, Fourth Class Fish Culturist	June 17, 1913

Brookdale Hatchery.

H. L. Nehf, Temporary Hatchery Foreman	February 10, 1915
L. E. Breese, Temporary Employee	February 14, 1915

Scott Creek Station.

R. Mattei, Temporary Assistant Spawn Taker	February 10, 1915

Fort Seward Hatchery.

S. Campbell, Temporary Employee	March 6, 1916

Tahoe Hatcheries.

Clarence Christiansen, Temporary Employee	April 26, 1915
O. W. Dickey, Watchman (Tallac)	February 1, 1915
O. P. Wehrman, Watchman (Tahoe)	November 1, 1913
Geo. Simpson, Temporary Employee	April 15, 1915
G. E. West, Fourth Class Fish Culturist	April 1, 1908

Bear Valley Hatchery.

W. L. Gatchell, Fourth Class Fish Culturist	June 20, 1913
G. L. Morrison, Fourth Class Fish Culturist	May 26, 1913

Inyo County Hatchery.

A. E. Glidden, Fourth Class Fish Culturist	January 15, 1914

Almanor Hatchery.

Jas. H. Vogt, Temporary Employee	October 23, 1915

Commercial Fisheries Department.

N. B. Scofield,* In Charge	Special Fishery Investigation	June 1, 1897
	Fishery Expert	February 21, 1914
H. B. Nidever, Fishery Expert		June 29, 1908
R. B. Heacock, Assistant		May 1, 1907

Bureau of Education, Publicity and Research.

H. C. Bryant, Ph.D.,* In Charge	Research Fellow in Zoology; Special Work	January 1, 1911
	Game Expert	September 1, 1914

Sacramento office, Forum Building.

Under direction of Commissioner F. M. Newbert.

Geo. Neale	Assistant	April 1, 1903
	Assistant in Charge	October 1, 1911
Chas. L. Gilmore, Engineer-Draftsman		June 19, 1912
Geo. T. Hanley, Clerk and Stenographer		February 16, 1914
Leslie Rust, Office Boy		November 1, 1913

Los Angeles office, 426 Union League Building.

Under direction of Commissioner M. J. Connell.

H. I. Pritchard, Assistant In Charge	August 1, 1900
E. L. Hedderly, Assistant Research and Publicity	November 22, 1915
E. A. McKee, Clerk and Stenographer	September 16, 1911

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*Employment not continuous.

LIST OF REGULAR DEPUTIES.

San Francisco District.

Name and headquarters.	Date first appointed
Alameda County.	
J. L. Bundock, Oakland	September 1, 1910
Earle Downing, Pleasanton	August 27, 1908
Del Norte County.	
H. S. Prescott, Crescent City	August 16, 1915
Fresno County.	
S. L. N. Ellis, Fresno	May 1, 1909
F. A. Bullard, Dunlap	February 1, 1912
Tipton Mathews, Coalinga	October 6, 1911
Humboldt County.	
Earl P. Barnes, Eureka	May 1, 1911
Theo. M. Benson, Fortuna	October 1, 1911
Kings County.	
E. W. Smalley, Hanford	May 1, 1909
Marin County.	
D. H. Hoen, San Rafael	September 23, 1910
Mendocino County.	
B. H. Miller, Ukiah	July 1, 1908
Chas. R. Perkins, Fort Bragg	June 15, 1912
John H. Hellard, Laytonville	July 17, 1915
Merced County.	
R. S. Kimball, Merced	October 22, 1914
Monterey County.	
P. H. Oyer, Pacific Grove	May 1, 1912
Frank Shook, Salinas	November 15, 1907
Napa County.	
W. J. Moore, Napa	September 1, 1907
San Francisco County.	
M. S. Clark, San Francisco	August 20, 1911
Ed. Boyle, San Francisco	August 13, 1913
J. W. Gallaway (Launch "Barracuda"), San Francisco	October 1, 1914
H. H. Hunt, San Francisco	October 1, 1914
San Mateo County.	
John Burke, Colma	July 1, 1915
Santa Clara County.	
I. L. Koppel, San Jose	August 1, 1909
Santa Cruz County.	
J. H. Hill, Watsonville	December 13, 1907
T. F. Maloney, Santa Cruz	October 1, 1914
Sonoma County.	
A. F. Lea, Cloverdale	April 25, 1903
Henry Lencioni, Santa Rosa	February 15, 1910
Paul Smith, Guerneville	June 15, 1912
Solano County.	
W. H. Armstrong, Vallejo	April 1, 1907

Name and headquarters.	Date first appointed
Stanislaus County.	
J. E. Newsome, Newman	December 1, 1906
Tuolumne County.	
Geo. F. Grant, Columbia	February 2, 1914
Tulare County.	
O. P. Brownlow, Porterville	July 1, 1914
Launch "Quinnat."	
H. E. Foster, Vallejo	April 15, 1912
Chas. M. Bouton, Vallejo	January 1, 1916

Sacramento District.

Amador County.	
Frank S. Parke, Sutter Creek	January 10, 1912
Calaveras County.	
Dr. D. E. Roberts, Murphys	October 1, 1911
Colusa County.	
S. J. Carpenter, Maxwell	October 1, 1910
El Dorado County.	
Euell Gray, Placerville	September 1, 1911
Lassen County.	
Frank P. Cady, Susanville	November 15, 1909
Modoc County.	
Geo. W. Courtright, Canby	October 25, 1912
Nevada County.	
R. C. O'Connor, Grass Valley	November 17, 1910
J. H. Sanders, Truckee	May 1, 1916
Placer County.	
Chester Scroggs, Loomis	August 17, 1911
Plumas County.	
L. J. Warren, Taylorsville	October 1,1914
Sacramento County.	
C. H. Biemer, Sacramento	January 29, 1912
W. J. Green, Sacramento	November 1, 1911
San Joaquin County.	
Albert Tracy (Launch), Stockton	March 4, 1916
Richard Squire, Lodi	October 1, 1910
Shasta County.	
J. S. White, Castella	October 1, 1908
Siskiyou County.	
J. W. Harris, Greenview	July 1, 1913
L. A. Streuber, Gazelle	October 1, 1914
Sutter County.	
E. D. Ricketts, Live Oak	October 1, 1910
Tehama County.	
T. W. Birmingham, Red Bluff	September 11, 1903
Trinity County.	
G. O. Laws, Weaverville	February 1, 1908
Yolo County.	
R. L. Sinkey, Woodland	December 1, 191

Los Angeles District.

Name and headquarters	Date first appointed
Inyo County.	
E. H. Ober, Big Pine	September 15, 1908
Kern County.	
A. J. Stout, Bakersfield	April 1, 1914
Los Angeles County.	
H. D. Becker, Los Angeles	October 1, 1914
Orange County.	
W. K. Robinson (on furlough), El Toro	October 25, 1909
Riverside County.	
Jas. H. Gyger, Elsinore	October 4, 1911
San Bernardino County.	
W. C. Malone, San Bernardino	February 1, 1916
San Diego County.	
Webb Toms, San Diego	April 1, 1907
A. T. Norton, (Crawfish Inspector), San Diego	February 11, 1913
San Luis Obispo County.	
C. S. Bauder, San Luis Obispo	October 1, 1914
Santa Barbara County.	
H. J. Abels, Santa Maria	August 1, 1905
Ventura County.	
J. J. Barnett, Ventura	January 19, 1914

Hayward Game Farm.

W. N. Dirks, Superintendent	December 15, 1911

INVENTORY OF STATE PROPERTY—FISH AND GAME COMMISSION DECEMBER 31, 1915.

Recapitulation.

Office equipment, San Francisco	$3,051 76	
Assistants' equipment, San Francisco District	269 45	
Store-room at Ferry, San Francisco	193 65	
		$3,514 86
Office equipment, Sacramento	$743 75	
Assistants' equipment, Sacramento District	576 90	
		1,320 65
Office equipment, Los Angeles	$537 45	
Assistants' equipment, Los Angeles District	92 00	
		629 45
Office equipment, Fresno*	$765 20	
Assistants' equipment, Fresno District	22 65	
		787 85
Scientific investigation		518 45
Game Farm, Hayward—Including cottage, tank-house, pond, equipment and stock		7,001 20
Launch "Quinnat" and equipment	$4,543 55	
Launch "Shad" and equipment	825 84	
Launch "Audubon" and equipment	229 08	
Launch "Barracuda" and equipment	799 92	
		6,398 39
Sisson Hatchery, including fish distribution car and equipment, buildings, ponds and furnishings		46,344 97

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*Office closed February 1, 1916, and property moved to San Francisco office.

Klamath River Stations.

Bogus Creek	$419 45		
Camp Creek	255 45		
Gottville	150 00		
Ferry	3 50		
Shovel Creek	38 40		
Copco	50 00		
		916 80	
Burney Creek Station		578 65	

Tahoe Hatcheries.

Tahoe City	$9,823 80		
Tallac	5,276 19		
Glen Alpine	30 40		
		15,130 39	
Price Creek Hatchery†	$ 3,633 85		
Brookdale Hatchery	17 05		
Scott Creek Station	19 95		
Ukiah Hatchery	84 95		
Snow Mountain Station	1,003 34		
Bear Valley Hatchery	93 00		
Mariett Lake Hatchery	3 40		
		4,855 54	
			$87,997 20

SISSON HATCHERY.

Fish Distribution by Counties. Season 1914.

ALAMEDA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Earle Downing	June 9	Stony Brook	12,000
Earle Downing	June 9	Alameda Creek	18,000
Earle Downing	June 9	Trout Creek	4,000
Earle Downing	June 9	Arroyo Bayo	24,000
Earle Downing	June 9	Trout Creek	9,000
Earle Downing	June 9	Mocho Creek	18,000
Earle Downing	June 9	Livermore Creek	6,000
Earle Downing	June 9	Cedar Mountain Creek	3,000
Earle Downing	June 9	San Lorenzo River	15,000
Earle Downing	June 9	Keiser Creek	9,000
Earle Downing	June 9	Palmores Creek	36,000
Earle Downing	June 9	Bellinas Creek	6,000
Earle Downing	June 9	Crow Creek	18,000
Earle Downing	June 9	Zeile Creek	9,000
Earle Downing	June 9	Alameda Creek	15,000
Earle Downing	June 9	La Costa Creek	15,000
Earle Downing	June 9	Indian Creek	9,000
Earle Downing	June 9	Calaveras Creek	12,000
Earle Downing	June 9	Apperson Creek	9,000
		Total	247,000

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†Moved to Fort Seward Hatchery February 1, 1916.

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

ALPINE COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Grant P. Merrill	Sept. 9	Silver Creek	9,000
Grant P. Merrill	Sept. 9	Pleasant Valley Creek	6,000
Grant P. Merrill	Sept. 9	West Fork of Carson	15,000
Chas. Tryson	Sept. 9	North Fork of Mokelumne River	12,000
Chas. Tryson	Sept. 9	Highland Creek	12,000
		Total	54,000

Distribution of Loch Leven Trout.

Grant P. Merrill	Sept. 9	Hot Spring Creek	6,000
Grant P. Merrill	Sept. 9	West Fork of Carson	14,000
		Total	20,000

AMADOR COUNTY.

Distribution of Rainbow Trout.

W. G. Snyder	Sept. 24	Mokelumne River	2,000
W. G. Snyder	Sept. 24	Mill Creek	2,000
W. G. Snyder	Sept. 24	Tiger Creek	2,000
W. G. Snyder	Sept. 24	Antelope Creek	2,000
G. C. Bruce	Sept. 24	North Fork of Mokelumne River	4,000
G. C. Bruce	Sept. 24	Blue Creek	4,000
		Total	16,000

Distribution of Eastern Brook Trout.

Sutter Creek Fish Club	Sept. 24	Sutter Creek	10,000

Distribution of Loch Leven Trout.

Sutter Creek Fish Club	Sept. 24	Sutter Creek	14,000

Distribution of Black Spotted Trout.

W. G. Snyder	Sept. 24	Mokelumne River	3,000
W. G. Snyder	Sept. 24	Mill Creek	3,000
W. G. Snyder	Sept. 24	Tiger Creek	3,000
W. G. Snyder	Sept. 24	Antelope Creek	3,000
Jackson Merchants Assn.	Sept. 24	Mill Creek	12,000
Jackson Merchants Assn.	Sept. 24	Panther Creek	12,000
Jackson Merchants Assn.	Sept. 24	Tiger Creek	12,000
S. D. Calvin	Sept. 24	Mill Creek	6,000
S. D. Calvin	Sept. 24	Tiger Creek	6,000
G. C. Bruce	Sept. 24	North Fork of Mokelumne River	6,000
G. C. Bruce	Sept. 24	Blue Creek	6,000
		Total	72,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

BUTTE COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Leonard Terrell	July 2	Philbrook	15,000
Clay Buchanan	July 2	West Branch Feather River	3,000
Clay Buchanan	July 2	Rebsen Ravine	6,000
Clay Buchanan	July 2	Cole Canyon	6,000
Bert F. Kauffman	July 2	North Fork of West Branch of Feather River	30,000
W. J. Whittier	July 2	North Fork of West Branch of Feather River	21,000
F. M. Thatcher	July 2	North Fork of West Branch of Feather River	24,000
A. J. Hanley	July 2	West Branch of Feather River	4,000
A. J. Hanley	July 2	Butte Creek	6,000
William Cabberlin	Aug. 20	Berry Creek	12,000
Butte Meadows Fishing Club	Sept. 18	Willow Creek	12,000
Butte Meadows Fishing Club	Sept. 18	Colby Creek	12,000
		Total	151,000

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Leonard Terrell	July 2	Philbrook	8,000
Clay Buchanan	July 2	West Branch of Feather River	10,000
Lee Richardson	Aug. 30	Mud Creek	14,000
Al. Lindquist	Sept. 8	Little Chico Creek	12,000
Butte Meadows Fishing Club	Sept. 18	Butte Creek	16,000
Annie E. K. Bidwell	Sept. 18	Chico Creek	20,000
		Total	80,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
W. J. Whittier	July 2	North Fork of West Branch of Feather River	8,000
A. J. Hanley	July 2	West Branch of Feather River	10,000
A. J. Hanley	July 2	Butte Creek	5,000
J. C. Carter	July 2	Big Chico Creek	24,000
Butte Meadows Fishing Club	Sept. 18	Bull Creek	8,000
		Total	55,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Bert F. Kauffman	July 2	North Fork of West Branch of Feather River	10,000
W. J. Whittier	July 2	North Fork of West Branch of Feather River	10,000
F. M. Thatcher	July 2	North Fork of West Branch of Feather River	20,000
W. E. Kemf	July 2	Big Chico Creek	10,000
William Cabberlin	Aug. 20	Berry Creek	8,000
		Total	58,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

CALAVERAS COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
T. W. Taylor	Sept. 24	South Fork of Mokelumne River	18,000
Claude T. Smith	Sept. 24	North Fork of Mokelumne River	9,000
Claude T. Smith	Sept. 24	Bear Creek	9,000
P. S. Peek	Sept. 24	South Fork of Mokelumne River	9,000
P. S. Peek	Sept. 24	Esperanza Creek	9,000
		Total	54,000

Distribution of Loch Leven Trout.

T. W. Taylor	Sept. 24	Licking Fork of Mokelumne River	10,000
Sam E. Redmond	Nov. 12	North Fork of Stanislaus River	2,000
Ben Stephens	Nov. 12	O'Neal's Creek	4,000
M. P. Avery	Nov. 12	San Antone Creek	4,000
		Total	20,000

Distribution of Rainbow Trout.

T. W. Taylor	Sept. 24	South Fork of Mokelumne River	6,000
Claude T. Smith	Sept. 24	Middle Fork of Mokelumne River	4,000
Claude T. Smith	Sept. 24	North Fork of Mokelumne River	4,000
P. S. Peek	Sept. 24	South Fork of Mokelumne River	8,000
Sam E. Redmond	Nov. 12	North Fork of Stanislaus River	2,000
Ben Stephens	Nov. 12	San Antone Creek	4,000
M. P. Avery	Nov. 12	San Antone Creek	4,000
		Total	32,000

COLUSA COUNTY

Distribution of Rainbow Trout.

Lovelace & Karrth	July 29	North Fork of Stony Creek	6,000
A. C. Kaufman	Nov. 16	Little Stony Creek	4,000
		Total	10,000

Distribution of Loch Leven Trout.

Lovelace & Karrth	July 29	Middle Fork of Stony Creek	6,000
Lovelace & Karrth	July 29	Paradise Creek	4,000
A. C. Kaufman	Nov. 16	Little Stony Creek	20,000
		Total	30,000

DEL NORTE COUNTY.

Distribution of Quinnat Salmon.

Fish and Game Com.	May 1	Smith's River	100,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

EL DORADO COUNTY.

Distribution of Bass.

Applicant	Date	Water stocked	Number
F. G. Warner and D. M. Stevenson	Aug. 21	North Fork of Cosumnes River	50

Distribution of Loch Leven Trout.

R. E. Granlees	Sept. 14	Trout Creek	4,000
Tait & Mann	Sept. 14	Tallac Creek	8,000
J. W. S. Buttler	Sept. 14	Echo Lake	12,000
Ralph L. Colwell	Sept. 19	Rock Bound Lake	10,000
Glen Alpine Springs	Sept. 19	Half Moon Lake	6,000
Glen Alpine Springs	Sept. 19	Heather Lake	4,000
Glen Alpine Springs	Sept. 19	Grass Lake	2,000
Glen Alpine Springs	Sept. 19	Lost Lake	2,000
Nelson L. Salter	Sept. 19	Granite Lake	4,000
Euell Gray	Nov. 11	American River	6,000
Euell Gray	Nov. 11	Cosumnes River	14,000
		Total	72,000

Distribution of Eastern Brook Trout.

F. J. Pomin	Sept. 14	Richardson Lake	8,000
R. E. Granlees	Sept. 14	Trout Creek	4,000
Tait & Mann	Sept. 14	Little Truckee River	8,000
James Bryson	Sept. 14	South Fork of American River	12,000
J. W. S. Buttler	Sept. 14	Echo Lake	8,000
Ralph L. Colwell	Sept. 19	Rock Bound Lake	8,000
Glen Alpine Springs	Sept. 19	Heather Lake	2,000
Glen Alpine Springs	Sept. 19	Grass Lake	6,000
Glen Alpine Springs	Sept. 19	Lucile Lake	2,000
Glen Alpine Springs	Sept. 19	Margery Lake	2,000
Nelson L. Salter	Sept. 19	Eagle Lake	3,000
Nelson L. Salter	Sept. 19	Eagle Creek	1,000
Murphy Bros. & Morgan	Sept. 19	Hank Richardson Creek	10,000
Euell Gray	Nov. 11	American River	50,000
		Total	124,000

Distribution of Rainbow Trout.

F. J. Pomin	Sept. 14	Richardson Lake	8,000
Tait & Mann	Sept. 14	Fallen Leaf Lake	4,000
Ralph L. Colwell	Sept. 19	Rubicon River	6,000
Glen Alpine Springs	Sept. 19	Half Moon Lake	2,000
Glen Alpine Springs	Sept. 19	Heather Lake	2,000
Glen Alpine Springs	Sept. 19	Grass Lake	4,000
Murphy Bros. & Morgan	Sept. 19	Buck Lake	8,000
Euell Gray	Nov. 11	American River	30,000
		Total	64,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

FRESNO COUNTY.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Hall & McAfee	Sept. 1	South Fork of Kings River	8,000
W. H. Tower	Sept. 30	Pitman Creek	4,000
San Joaquin and Eastern Railroad	Sept. 30	Huntington Lake	90,000
		Total	102,000

Distribution of Rainbow Trout.

W. H. Trowes	Sept. 30	Balsam Creek	4,000
San Joaquin and Eastern Railroad	Sept. 30	Huntington Lake	50,000
		Total	54,000

Distribution of Loch Leven Trout.

Hall & McAfee	Sept. 1	South Fork of Kings River	8,000
W. H. Trowes	Sept. 1	Big Creek	8,000
San Joaquin and Eastern Railroad	Sept. 30	Huntington Lake	44,000
		Total	60,000

GLENN COUNTY.

Distribution of Rainbow Trout.

B. H. Mace	July 29	Elk Creek	2,000
B. H. Mace	July 29	Salt Creek	6,000
		Total	8,000

Distribution of Eastern Brook Trout.

B. H. Mace	July 29	Elk Creek	6,000
B. H. Mace	July 29	Salt Creek	10,000
		Total	16,000

Distribution of Loch Leven Trout.

B. H. Mace	July 29	Elk Creek	10,000
B. H. Mace	July 29	Salt Creek	6,000
		Total	16,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

INYO COUNTY.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
D. M. Nicoll	Sept. 1	Lone Pine Creek	10,000
Roscoe Parkinson	Sept. 1	Lone Pine Creek	10,000
		Total	20,000

Distribution of Loch Leven Trout.

Hall & McAfee	Sept. 1	Big Pine Creek	4,000
Hall & McAfee	Sept. 1	Birch Creek	2,000
Hall & McAfee	Sept. 1	Baker Creek	2,000
D. M. Nicoll	Sept. 1	Tuttle Creek	10,000
Roscoe Parkinson	Sept. 1	Lone Pine Creek	10,000
		Total	28,000

Distribution of Black Spotted Trout.

Hall & McAfee	Sept. 1	Big Pine Lake	6,000
Hall & McAfee	Sept. 1	Little Pine Lake	6,000
D. M. Nicoll	Sept. 1	Haiwee Reservoir (public)	18,000
D. M. Nicoll	Sept. 1	Richtes Creek	12,000
Roscoe Parkinson	Sept. 1	Lone Pine Lakes	16,000
Roscoe Parkinson	Sept. 1	Tuttle Creek	14,000
		Total	72,000

KERN COUNTY.

Distribution of Sunfish.

Chanslor Canfield Oil Co.	Oct. 17	Reservoir at Fellows	25

Distribution of Loch Leven Trout.

R. R. Martin	Aug. 30	Alder Creek	4,000
L. P. Allen	Aug. 31	Erskine Creek	2,000
W. W. Laidley	Oct. 9	Rancherie Creek	4,000
Kern River Trout Club	Oct. 9	Cedar Creek	10,000
Kern River Trout Club	Oct. 9	Poso Creek	6,000
		Total	26,000

Distribution of Eastern Brook Trout.

Kern River Trout Club	Oct. 9	Cedar Creek	5,000
Kern River Trout Club	Oct. 9	Lumbro Creek	9,000
		Total	14,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
R. R. Martin	Aug. 30	Alder Creek	4,000
L. P. Allen	Aug. 31	Erskine Creek	2,000
W. W. Laidley	Oct. 9	Rancherie Creek	4,000
Kern River Trout Club	Oct. 9	Cedar Creek	8,000
		Total	18,000

LAKE COUNTY.

Distribution of Steelhead Trout.

E. W. Schwartz	July 25	Kelsey Creek	12,000

Distribution of Loch Leven Trout.

E. W. Schwartz	July 25	Kelsey Creek	21,000
Allen Springs Club	July 25	Bartlett Creek	8,000
		Total	32,000

Distribution of Rainbow Trout.

Allen Springs Club	July 25	North Fork Cache Creek	8,000

LASSEN COUNTY.

Distribution of Black Spotted Trout.

Frank P. Cady	Oct. 4	Susan River	30,000
Red River Lumber Co.	Oct. 4	Hamilton Branch, North Fork Feather River	5,000
Red River Lumber Co.	Oct. 4	Rock Creek	4,000
Red River Lumber Co.	Oct. 4	Robbers Creek	6,000
		Total	45,000

Distribution of Loch Leven Trout.

Frank P. Cady	Oct. 4	Susan River	2,000
Frank P. Cady	Oct. 4	Eagle Lake	10,000
Frank P. Cady	Oct. 4	Butte Lake	8,000
Ray C. Bogart	Oct. 4	Hamilton Branch, North Fork Feather River	20,000
Red River Lumber Co.	Oct. 4	Robbers Creek	10,000
		Total	50,000

Distribution of Rainbow Trout.

Frank P. Cady	Oct. 4	Susan River	8,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

LOS ANGELES COUNTY.

Distribution of Sunfish.

Applicant	Date	Water stocked	Number
J. A. Crane	Nov. 5	Little Matthewson Lake	100

Distribution of Bass.

Los Angeles Dept. Public Service	Oct. 18	Dry Canyon Reservoir	150
H. W. O'Melveny	Nov. 5	Reservoir	100
		Total	250

Distribution of Steelhead Trout.

G. E. Little	Oct. 29	San Jose Creek	3,000
G. E. Little	Oct. 29	Mission Creek	3,000
G. E. Little	Oct. 29	Lower waters of San Gabriel	6,000
H. W. O'Melveny	Nov. 5	San Gabriel River	30,000
		Total	42,000

Distribution of Loch Leven Trout.

H. W. O'Melveny	Nov. 5	San Gabriel River	20,000

Distribution of Eastern Brook Trout.

W. J. Sanborn	Oct. 18	Bear Canyon	8,000

Distribution of Rainbow Trout.

William G. Kerckhoff	Oct. 18	San Antonio Creek	10,000
O. L. Roberts	Nov. 5	Big Santa Anita	2,000
O. L. Roberts	Nov. 5	Winter Creek	2,000
O. L. Roberts	Nov. 5	East Fork of Big Santa Anita	4,000
H. W. O'Melveny	Nov. 5	San Gabriel River	80,000
		Total	98,000

MARIN COUNTY.

Distribution of Steelhead Trout.

Cal. Anglers' Association	Aug. 2	Olema Creek	30,000
Cal. Anglers' Association	Aug. 2	Paper Mill Creek	45,000
Cal. Anglers' Association	Aug. 2	Lake Lagunitas	37,500
W. Gaston Donieque	Aug. 2	Frank Valley Creek	10,000
W. Gaston Donieque	Aug. 2	Sheep Ravine Creek	5,000
		Total	127,500

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Cal. Anglers' Association	Aug. 2	Lake Lagunitas	30,000

Distribution of Eastern Brook Trout.

Con. Roman	Aug. 2	Cheda Creek	2,000

MARIPOSA COUNTY.

Distribution of Black Spotted Trout.

Cal. Anglers' Association	Oct. 13	Moss Canyon Creek	25,000
Cal. Anglers' Association	Oct. 13	Crane Creek	50,000
Cal. Anglers' Association	Oct. 13	Bridal Vail Creek	30,000
		Total	105,000

Distribution of Loch Leven Trout.

Jno. S. Washburn	Oct. 9	South Fork of Merced River	6,000
Jno. S. Washburn	Oct. 9	Two lakes, about twenty miles east of Wawona	4,000
Edwin T. Huffman	Oct. 9	Miami Creek	8,000
Cal. Anglers' Association	Oct. 13	Moss Canyon Creek	20,000
Cal. Anglers' Association	Oct. 13	Bridal Veil Creek	30,000
Cal. Anglers' Association	Oct. 13	Yosemite Creek	30,000
Yosemite Valley R. R. Co.	Oct. 13	Merced River	36,000
		Total	131,000

Distribution of Eastern Brook Trout.

Yosemite Valley R. R. Co.	Oct. 13	Merced River	10,000

Distribution of Rainbow Trout.

Edwin T. Huffman	Oct. 9	Miami Creek	4,000
Yosemite Valley R. R. Co.	Oct. 13	Merced River	4,000
		Total	8,000

MENDOCINO COUNTY.

Distribution of Steelhead Trout.

Cal. Western R. R.	July 7	Pudding Creek	30,000
Cal. Western R. R.	July 8	Noyo River	240,000
J. W. Lowell and W. M. Standley	July 8	Jaun Creek	25,000
		Total	295,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

MERCED COUNTY.

Distribution of Catfish.

Applicant	Date	Water stocked	Number
Joseph Paxton	Oct. 17	Reservoir	35

MODOC COUNTY.

Distribution of Black Spotted Trout.

Jesse Parman	Aug. 20	Emerson Creek	6,000
C. G. Spargur	Aug. 20	South Fork of Pit River	3,000
F. W. Caldwell	Aug. 20	Thomas Creek	3,000
J. T. Spaulding	Aug. 20	Thomas Creek	12,000
W. H. Flournoy	Aug. 20	South Fork of Pit River	3,000
James Thomas	Aug. 20	Big Doby Reservoir	3,000
James Poindexter	Aug. 20	Davis Creek	12,000
John Wall	Aug. 20	Goose Lake	9,000
T. F. Donnaway	Aug. 20	Goose Lake	6,000
		Total	57,000

Distribution of Loch Leven Trout.

Jesse Parman	Aug. 20	Eagle Creek	4,000
C. G. Spargur	Aug. 20	South Fork of Pit River	4,000
F. W. Caldwell	Aug. 20	Thomas Creek	2,000
J. T. Spaulding	Aug. 20	Thomas Creek	4,000
W. H. Flournoy	Aug. 20	South Fork of Pit River	4,000
James Thomas	Aug. 20	Big Doby Reservoir	4,000
James Poindexter	Aug. 20	Davis Creek	4,000
T. F. Donnaway	Aug. 20	Goose Lake	4,000
L. H. Sisson	Aug. 20	East Creek	6,000
Omar Camtrall	Aug. 20	Fitzhugh Creek	4,000
		Total	40,000

Distribution of Eastern Brook Trout.

Grover Wimer	Aug. 20	Mill Creek	4,000
James Thomas	Aug. 20	Big Doby Reservoir	4,000
Omar Cantrall	Aug. 20	Fitzhugh Creek	4,000
		Total	12,000

Distribution of Rainbow Trout.

C. G. Spargur	Aug. 20	South Fork of Pit River	4,000
L. H. Sisson	Aug. 20	East Creek	2,000
		Total	6,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

MONTEREY COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
J. L. D. Roberts	June 17	Carmel River	60,000
J. L. D. Roberts	June 17	Dand Creek	3,000
J. L. D. Roberts	June 17	Sobrauns Creek	3,000
J. L. D. Roberts	June 17	Garrapatis Creek	6,000
J. L. D. Roberts	June 17	Rocky Creek	12,000
J. L. D. Roberts	June 17	Mill Creek	12,000
J. L. D. Roberts	June 17	Little Sur River	24,000
J. L. D. Roberts	June 17	Big Sur	15,000
A. H. Abbott	June 14	Arroyo Seco	15,000
T. P. Joy	Oct. 29	Mud Creek	3,000
T. P. Joy	Oct. 29	Gabilan Creek	9,000
		Total	162,000

Distribution of Loch Leven Trout.

S. E. Whitcher	Oct. 29	Horse Canyon Creek	6,000
S. E. Whitcher	Oct. 29	Pajaro River	6,000
S. E. Whitcher	Oct. 29	Piney Creek	2,000
S. E. Whitcher	Oct. 29	Arroyo Seco	2,000
		Total	16,000

NAPA COUNTY.

Distribution of Steelhead Trout.

West & Keyser	July 25	Napa Creek	37,500
C. H. Drake	July 25	Richie Creek	30,000
City of Vallejo	July 25	Lake Madigan	60,000
J. E. Beard	July 25	Rector Canyon	25,000
J. P. Orr	July 25	Soscol Creek	15,000
Clifford Clark	July 29	Capell Creek	18,000
Clifford Clark	July 29	Trout Creek	18,000
		Total	203,500

Distribution of Loch Leven Trout.

City of Vallejo	Oct. 25	Lake Fry	22,000
L. A. Pritchard	Oct. 25	Small lakes	4,000
		Total	26,000

Distribution of Eastern Brook Trout.

L. A. Pritchard	July 25	Small lakes	4,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

NEVADA COUNTY.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
S. F. Fly Casting Club	Sept. 8	Truckee River	12,000
Boca Mill Co.	Sept. 8	Little Truckee River	16,000
Truckee Chamber of Com.	Sept. 19	Mill Pond, Truckee River	6,000
Grass Val. Sportsman Club	Oct. 2	Bear River	16,000
Grass Val. Sportsman Club	Oct. 2	Indian Canyon	4,000
Grass Val. Sportsman Club	Oct. 2	Haas Lake	2,000
Grass Val. Sportsman Club	Oct. 2	South Yuba River	8,000
		Total	64,000

Distribution of Eastern Brook Trout.

S. McKay	July 19	Juniper Creek	6,000
Boca Mill Co.	Sept. 8	Juniper Creek	10,000
Pacific Gas and Elec. Co.	Sept. 13	Fordyce Creek	7,000
Pacific Gas and Elec. Co.	Sept. 13	South Yuba River	7,000
Truckee Chamber of Com.	Sept. 18	Mardis Creek	14,000
Grass Val. Sportsman Club	Oct. 2	Shebley's Creek	4,000
Grass Val. Sportsman Club	Oct. 2	Upper Wolf Creek	4,000
Grass Val. Sportsman Club	Oct. 2	Rattlesnake Creek	4,000
Grass Val. Sportsman Club	Oct. 2	Squirrel Creek	4,000
Grass Val. Sportsman Club	Oct. 2	South Yuba River	14,000
		Total	74,000

Distribution of Loch Leven Trout.

S. F. Fly Casting Club	Sept. 8	Truckee River	16,000
Pacific Gas and Elec. Co.	Sept. 13	Bloody River	20,000
Truckee Chamber of Com.	Sept. 19	Donner Creek	8,000
		Total	44,000

Distribution of Black Spotted Trout.

E. J. Rees	Sept. 8	Crystal Lake	15,000
Pacific Gas and Elec. Co.	Sept. 13	Fordyce Creek	25,000
Pacific Gas and Elec. Co.	Sept. 13	South Yuba River	20,000
		Total	60,000

ORANGE COUNTY.

Distribution of Steelhead Trout.

W. K. Robinson	Nov. 5	Lower Trebuco	6,000
F. A. Foster	Nov. 6	San Juan	18,000
		Total	24,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
W. K. Robinson	Nov. 5	Silverado Creek	4,000
W. K. Robinson	Nov. 5	Santiago Creek	4,000
W. K. Robinson	Nov. 5	Upper Trebuco	4,000
W. K. Robinson	Nov. 5	Upper Trebuco	2,000
F. A. Foster	Nov. 6	San Juan	4,000
		Total	18,000

PLACER COUNTY.

Distribution of Sunfish.

L. G. Merrithew	Aug. 23	Powers Lake	100

Distribution of Black Spotted Trout.

J. G. Dodds	Sept. 8	Secret Canyon	12,000

Distribution of Loch Leven Trout.

H. M. Freeman	July 19	Loch Leven Lakes	16,000
H. M. Freeman	Sept. 8	South Yuba River	4,000
D. M. Ray and G. H. Smith	Sept. 8	North Fork of Middle Fork of North Fork of American River	4,000
D. M. Ray and G. H. Smith	Sept. 8	Grouse Canyon	2,000
J. G. Dodds	Sept 8	Secret Canyon	8,000
Lake Tahoe Railway and Transportation Co.	Sept. 14	Truckee River	12,000
Scott Bros.	Sept. 14	Silver Creek	2,000
Scott Bros.	Sept. 14	Squaw Creek	6,000
W. J. McCleary	Sept. 18	Brushy Canyon	8,000
		Total	62,000

Distribution of Eastern Brook Trout.

S. McKay	July 19	Klondyke Creek	6,000
H. M. Freeman	July 19	South Yuba River	10,000
S. H. Cavitt	July 19	Martis Creek	10,000
William Ewer	July 19	Canyon Creek	8,000
Frank L. Harmon	July 19	Canyon Creek	8,000
W. N. West	July 19	American River	8,000
W. J. McCleary	July 19	Shirttail Canyon	10,000
M. L. West	July 19	Yuba River	6,000
J. B. Knapp	July 19	North Fork of American River	10,000
D. M. Ray and G. H. Smith	Sept. 8	North Fork of Middle Fork of North Fork of American River	2,000
D. M. Ray and G. H. Smith	Sept. 8	Grouse Canyon	2,000
Lake Tahoe R. & T. Co.	Sept. 14	Barker Creek	3,000
Lake Tahoe R. & T. Co.	Sept. 14	Watson Lake	7,000
Lake Tahoe R. & T. Co.	Sept. 14	Bear Pen Creek	2,000
Tahoe Vista I. Co.	Sept. 14	Griff Creek	8,000
Scott Bros.	Sept. 14	Silver Creek	2,000
Scott Bros.	Sept. 14	Squaw Creek	10,000
F. R. Kohl	Sept. 19	Blackwood Creek	8,000
W. J. McCleary	Nov. 16	North Fork of American River	24,000
		Total	144,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
H. M. Freeman	July 19	South Yuba River	10,000
Frank L. Harmon	July 19	Canyon Creek	8,000
W. N. West	July 19	American River	8,000
W. J. McCleary	July 19	American River	6,000
M. L. West	July 19	Yuba River	4,000
D. M. Ray and G. H. Smith	Sept. 8	North Fork of Middle Fork of North Fork of American River	2,000
D. M. Ray and G. H. Smith	Sept. 8	Grouse Creek	2,000
Lake Tahoe R. & T. Co.	Sept. 14	Truckee River	12,000
		Total	52,000

PLUMAS COUNTY.

Distribution of Loch Leven Trout.

J. W. Middleton	Aug. 7	Grizzly Creek	10,000
J. W. Middleton	Aug. 7	Feather River	10,000
Quincy Chamber of Com.	Aug. 7	Thompson Creek	10,000
Quincy Chamber of Com.	Aug. 7	Mill Creek	6,000
H. P. Porter	Aug. 7	Mill Creek	7,500
H. P. Porter	Aug. 7	Reyes Creek	3,000
H. P. Porter	Aug. 7	Hot Spring Gulch	1,500
H. P. Porter	Aug. 7	Soda Creek	1,500
H. P. Porter	Aug. 7	East Branch	4,500
Chas. Jones	Aug. 13	Gray Eagle Creek	5,000
Chas. Jones	Aug. 13	Frazier Creek	7,000
J. A. Donnerwirth	Aug. 13	Light Creek	20,000
B. F. Darby	Aug. 13	Bucks Creek	4,000
B. F. Darby	Aug. 13	Haskins Creek	2,000
B. F. Darby	Aug. 13	Three Lakes	4,000
W. H. Day	Aug. 20	Rock Creek	2,000
W. H. Day	Aug. 20	Jackass Creek	4,000
W. H. Day	Aug. 20	Chambers Creek	4,000
Roger T. Remick	Aug. 20	Big Bonta Creek	7,000
Roger T. Remick	Aug. 20	Little Bonta Creek	3,000
Chas. Belden	Nov. 16	Yellow Creek	8,000
Chas. Belden	Nov. 16	Chipps Creek	2,000
		Total	126,000

Distribution of Rainbow Trout.

Quincy Chamber of Com.	Aug. 7	Greenhorn Creek	10,000
B. F. Pauly and E. P. Vandercook	Aug. 7	Willow Creek	5,000
B. F. Pauly and E. P. Vandercook	Aug. 7	Feather River	2,500
B. F. Pauly and E. P. Vandercook	Aug. 7	Nelson Creek	2,500
W. G. Hoffman	Aug. 7	Clear Creek	8,000
Chas. Jones	Aug. 13	Gray Eagle Creek	5,000
Chas. Jones	Aug. 13	Frazier Creek	5,000
D. N. Rogers	Aug. 13	Big Creek and branches	2,500
D. N. Rogers	Aug. 13	Clear Creek and branches	2,500
D. N. Rogers	Aug. 13	Bear Creek and branches	5,000
J. A. Donnerwirth	Aug. 13	Cooks Creek	14,000
Roger T. Remick	Aug. 20	Big Bonta Creek	7,000
Roger T. Remick	Aug. 20	Little Bonta Creek	3,000
		Total	72,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
J. W. Middleton	Aug. 7	Willow Creek	12,000
J. W. Middleton	Aug. 7	Humbug Creek	12,000
Quincy Chamber of Com.	Aug. 7	Rock Creek	6,000
Quincy Chamber of Com.	Aug. 7	Spanish Creek	24,000
B. T. Pauly and E. P. Vandercook	Aug. 7	Willow Creek	5,000
B. T. Pauly and E. P. Vandercook	Aug. 7	Feather River	5,000
B. T. Pauly and E. P. Vandercook	Aug. 7	Nelson Creek	5,000
D. N. Rogers	Aug. 13	Schnieder Creek	5,000
D. N. Rogers	Aug. 13	Big Creek and branches	12,500
D. N. Rogers	Aug. 13	Clear Creek and branches	5,000
D. N. Rogers	Aug. 13	Bear Creek and branches	7,500
S. A. Pezzola	Aug. 13	Jamison Creek	9,000
S. A. Pezzola	Aug. 13	Eureka Creek	21,000
J. A. Donnerwirth	Aug. 13	Indian Creek	24,000
B. F. Darby	Aug. 13	Haskins Creek	3,000
B. F. Darby	Aug. 13	Mill Creek	6,000
B. F. Darby	Aug. 13	Buck Creek	6,000
W. H. Day	Aug. 20	Rock Creek	5,000
W. H. Day	Aug. 20	Buck Creek	10,000
Roger T. Remick	Aug. 20	Big Bonta Creek	15,000
Roger T. Remick	Aug. 20	Little Bonta Creek	9,000
		Total	207,000

Distribution of Eastern Brook Trout.

J. W. Middleton	Aug. 7	Grizzly Creek	12,000
J. W. Middleton	Aug. 7	Willow Creek	10,000
J. W. Middleton	Aug. 7	Feather River	14,000
J. C. Donnelly	Aug. 7	Grizzly Creek	8,000
W. C. Hoffman	Aug. 7	Kellogg Creek	2,000
W. C. Hoffman	Aug. 7	Mill Creek	8,000
D. N. Rogers	Aug. 13	Three Lakes	5,000
D. N. Rogers	Aug. 13	Meadow Valley Creek	5,000
S. A. Pezzola	Aug. 13	Jamison Creek	4,000
S. A. Pezzola	Aug. 13	Eureka Lake	16,000
D. N. Rogers	Aug. 13	Greenhorn Creek	8,000
D. N. Rogers	Aug. 13	Spring Garden Creek	4,000
S. A. Pezzola	Aug. 13	Indian Creek	8,000
B. F. Darby	Aug. 13	Chipps Creek	2,000
		Total	106,000

RIVERSIDE COUNTY.

Distribution of Loch Leven Trout.

Ed Holderness	Oct. 18	Fullers Mill Canyon	4,000

Distribution of Eastern Brook Trout.

Ed Holderness	Oct. 18	Dark Canyon	4,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
B. H. Handy and H. T. Grout	Oct. 18	Spring Brook	4,000
Frank S. Johnson	Nov. 5	Coldwater Creek	4,000
John Shaver	Nov. 5	North Fork	6,000
John Shaver	Nov. 5	Strawberry Creek	2,000
John Shaver	Nov. 5	Indian Creek	4,000
		Total	20,000

SACRAMENTO COUNTY.

Distribution of Quinnat Salmon.

Fish and Game Com.	April 27	Sacramento River	335,000

SAN BERNARDINO COUNTY.

Distribution of Eastern Brook Trout.

W. J. Sanborn	Oct. 18	Ice House Creek	4,000
W. J. Sanborn	Oct. 18	Upper San Antonio	8,000
W. L. White	Oct. 18	Noble Creek	2,000
Frank Culver	Nov. 5	Mill Creek, lower	2,000
Frank Culver	Nov. 5	Mill Creek, upper	4,000
Frank Culver	Nov. 5	Mill Creek, second tributary	2,000
Jas. A. Vale	Oct. 30	Lytle Creek	12,000
Jas. A. Vale	Oct. 30	Plunge Creek	4,000
Jas. A. Vale	Oct. 30	South Fork	8,000
		Total	46,000

Distribution of Loch Leven Trout.

W. J. Sanborn	Oct. 18	San Antonio	4,000
W. L. White	Oct. 18	Noble Creek	2,000
Frank Culver	Nov. 5	Falls Creek	2,000
Frank Culver	Nov. 5	Mill Creek, first tributary	4,000
Jas. A. Vale	Oct. 30	Devil Canyon	8,000
Jas. A. Vale	Oct. 30	Waterman Canyon	8,000
Jas. A. Vale	Oct. 30	Cold Creek	8,000
Jas. A. Vale	Oct. 30	Huston Creek	4,000
Jas. A. Vale	Oct. 30	Seeley Creek	6,000
Jas. A. Vale	Oct. 30	Deep Creek	14,000
Jas. A. Vale	Oct. 30	City Creek	8,000
Jas. A. Vale	Oct. 30	Santa Ana River	8,000
		Total	76,000

Distribution of Rainbow Trout.

W. J. Sanborn	Oct. 18	San Antonio	14,000

Distribution of Black Spotted Trout.

Jas. A. Vale	Oct. 18	Big Bear Lake	138,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Large Lake Trout.

Applicant	Date	Water stocked	Number
Jas. A. Vale	Oct. 18	Big Bear Lake	12,000

SAN LUIS OBISPO COUNTY.

Distribution of Steelhead Trout.

San Luis Gun and Rod Club	June 27	See Canyon	12,000
San Luis Gun and Rod Club	June 27	North San Luis	12,000
San Luis Gun and Rod Club	June 27	East San Luis	9,000
San Luis Gun and Rod Club	June 27	West San Luis	6,000
San Luis Gun and Rod Club	June 27	Corral de Piedra	9,000
San Luis Gun and Rod Club	June 27	Steinner Creek	12,000
San Luis Gun and Rod Club	June 27	Islay Creek	12,000
San Luis Gun and Rod Club	June 27	Upper Choro	9,000
San Luis Gun and Rod Club	June 27	Middle Choro	12,000
San Luis Gun and Rod Club	June 27	Lower Choro	9,000
San Luis Gun and Rod Club	June 27	Mono Creek	6,000
San Luis Gun and Rod Club	June 27	Cambria Creek	6,000
San Luis Gun and Rod Club	June 27	Copper Mine Creek	6,000
San Luis Gun and Rod Club	June 27	Tono Creek	6,000
San Luis Gun and Rod Club	June 27	Old Creek	9,000
San Luis Gun and Rod Club	June 27	Prefermo Creek	3,000
San Luis Gun and Rod Club	June 27	Andrews Camp	3,000
San Luis Gun and Rod Club	June 27	Clark Valley	9,000
Dr. C. S. Noble	June 27	Arroyo Grande	30,000
Dr. C. S. Noble	June 27	Lopez Creek	21,000
		Total	201,000

SAN MATEO COUNTY.

Distribution of Steelhead Trout.

Ocean Shore Railroad	June 21	Tobin Creek	30,000
Ocean Shore Railroad	June 21	Dennison Creek	18,000
Ocean Shore Railroad	June 21	Frenchman Creek	18,000
Ocean Shore Railroad	June 21	Lobitos Creek	30,000
Ocean Shore Railroad	June 21	Tunitas Creek	30,000
Ocean Shore Railroad	June 21	Corte Madera	60,000
Ocean Shore Railroad	June 21	San Gregoria	3,000
J. B. Fleming	June 21	San Pedro Creek	30,000
Arthur E. Newman	June 21	Corte Madera	18,000
Arthur E. Newman	June 21	Bear Gulch	27,000
J. M. Huddart	Oct. 28	West Union Creek	7,500
J. M. Huddart	Oct. 28	Squealer Creek	1,250
J. M. Huddart	Oct. 28	Pond Creek	1,250
		Total	274,000

Distribution of Eastern Brook Trout.

Ocean Shore Railroad	June 21	Purisima Creek	4,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Cleveland Forbes	June 20	West Branch El Corte Madera	4,000
Ocean Shore Railroad	June 21	Purisima Creek	16,000
		Total	20,000

SANTA BARBARA COUNTY.

Distribution of Sunfish.

H. J. Abels	July 14	Lompoc city reservoir	14

Distribution of Quinnat Salmon.

H. J. Abels	July 14	Santa Ynez River	24,000

Distribution of Steelhead Trout.

H. J. Abels	July 14	Alamar Creek	3,000
H. J. Abels	July 14	Santa Ynez River	21,000
H. J. Abels	July 14	Sisquoc	9,000
H. J. Abels	July 14	Manzana	3,000
H. J. Abels	July 14	Alamo Creek	6,000
H. J. Abels	July 14	Tepusquet Creek	12,000
H. J. Abels	July 14	Zaca Creek	6,000
H. J. Abels	July 14	Naples Creek	6,000
H. J. Abels	July 14	San Jose Creek	6,000
H. J. Abels	July 14	Guadalupe Creek	3,000
		Total	75,000

Distribution of Loch Leven Trout.

H. J. Abels	July 14	Manzana	6,000
H. J. Abels	July 14	Ballard Creek	2,000
H. J. Abels	July 14	Fir Creek	2,000
H. J. Abels	July 14	Cachuma Creek	2,000
		Total	12,000

Distribution of Eastern Brook Trout.

H. J. Abels	July 14	Sisquoc	6,000
H. J. Abels	July 14	Alamo Creek	2,000
H. J. Abels	July 14	Lion Creek	2,000
		Total	10,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

SANTA CLARA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Earle Downing	June 9	Bear Creek	6,000
Earle Downing	June 9	Valpe Creek	5,000
I. L. Koppel	June 16	Coyote Creek	12,000
I. L. Koppel	June 16	Packwood Creek	9,000
I. L. Koppel	June 16	Los Animos	9,000
I. L. Koppel	June 16	Laurel Creek	6,000
I. L. Koppel	June 16	Packwood Creek	3,000
I. L. Koppel	June 16	Coyote Creek	9,000
I. L. Koppel	June 16	Little Arthur Creek	9,000
I. L. Koppel	June 16	Bodfish Creek	9,000
I. L. Koppel	June 16	Los Animos	6,000
I. L. Koppel	June 16	Valpe Creek	6,000
I. L. Koppel	June 16	Alameda Creek	3,000
I. L. Koppel	June 16	Sweijert Creek	3,000
I. L. Koppel	June 16	Silver Creek	3,000
I. L. Koppel	June 16	Penetentia Creek	9,000
I. L. Koppel	June 16	Guadalupe Creek	18,000
I. L. Koppel	June 16	Almad n Creek	12,000
I. L. Koppel	June 16	Trout Creek	9,000
I. L. Koppel	June 16	Campbell Creek	9,000
I. L. Koppel	June 16	Hooker Creek	3,000
I. L. Koppel	June 16	Gladas Creek	3,000
I. L. Koppel	June 26	Stevens Creek	15,000
I. L. Koppel	June 26	Lyndon Creek	5,000
I. L. Koppel	June 26	Cavanaugh Creek	5,000
I. L. Koppel	June 26	Hooper Creek	5,000
I. L. Koppel	June 26	Austrian Creek	2,500
I. L. Koppel	June 26	Los Gatos Creek	5,000
F. Marriott	June 26	Los Uvas Creek	24,000
E. L. Caldren	Oct. 28	Los Gatos Creek	15,000
		Total	237,500

Distribution of Eastern Brook Trout.

L. F. Cox	June 26	Booker Creek	2,000
L. F. Cox	June 26	Lake Ranch Creek	2,000
L. F. Cox	June 26	Van Ness Creek	4,000
		Total	8,000

SANTA CRUZ COUNTY.

Distribution of Blue Gill Sunfish.

Supervisors Santa Cruz County	Aug. 25	Lagoon near Watsonville	15

Distribution of Perch.

Supervisors Santa Cruz County	Aug. 25	Lagoon near Watsonville	15

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Watsonville Fish and Game Protective Assn.	Oct. 29	Corralitos Creek	9,000
Watsonville Fish and Game Protective Assn.	Oct. 29	Shingle Mill Creek	15,000
Watsonville Fish and Game Protective Assn.	Oct. 29	Diablo Creek	6,000
		Total	30,000

SHASTA COUNTY.

Distribution of Black Spotted Trout.

Dunsmuir Promotion Club	Sept. 6	Little Castle Creek	60,000
Dunsmuir Promotion Club	Sept. 6	Bear Creek	60,000
Dunsmuir Promotion Club	Sept. 6	Hedge Creek	60,000
Dunsmuir Promotion Club	Sept. 6	Soda Creek	60,000
Harmon Bell	Sept. 24	Sacramento River	30,000
		Total	270,000

Distribution of Loch Leven Trout.

W. H. Logan	June 26	Duncon Creek	4,000
W. H. Logan	June 26	Eagle Creek	2,000
C. L. Watson	June 8	Clear Creek	6,000
C. L. Watson	June 8	Five Mile Gulch	2,000
C. L. Watson	June 8	French Gulch Creek	2,000
Kennett Athletic Club	June 28	Big Back Bone Creek	15,000
E. E. Elfendahl	June 28	Slave Creek	8,000
Dunsmuir Promotion Club	Sept. 6	Hedge Creek	10,000
Dunsmuir Promotion Club	Sept. 6	Soda Creek	10,000
Harmon Bell	Sept. 24	Sacramento River	10,000
Sacramento Valley and Eastern Railroad	Oct. 3	Dedalles Creek	10,000
Hazel Gold Mining Co.	Oct. 17	Crystal Creek	8,000
Hazel Gold Mining Co.	Oct. 17	Five Mile Gulch	4,000
Hazel Gold Mining Co.	Oct. 17	Klines Gulch	4,000
		Total	95,000

Distribution of Eastern Brook Trout.

C. L. Watson	June 8	Clear Creek	4,000
C. L. Watson	June 8	Klines Gulch	2,000
		Total	6,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
W. H. Logan	June 26	Duncon Creek	2,000
W. H. Logan	June 26	Eagle Creek	4,000
Kennett Athletic Club	June 28	Big Back Bone Creek	6,000
E. Elfendahl	June 28	Slave Creek	8,000
Dunsmuir Promotion Club	Sept. 6	Little Castle Creek	10,000
Dunsmuir Promotion Club	Sept. 6	Bear Creek	10,000
Seymour S. Bass	Sept. 18	McCloud River	16,000
Sacramento Valley and Eastern Railroad	Oct. 8	Dedalles Creek	10,000
		Total	66,000

SIERRA COUNTY.

Distribution of Rainbow Trout.

W. C. Murdock	Sept. 8	French Creek	5,000
W. C. Murdock	Sept. 8	Little Truckee River	5,000
W. C. Murdock	Sept. 8	Lacy Valley Creek	10,000
		Total	20,000

Distribution of Eastern Brook Trout.

A. S. Nichols	July 19	Sierra Mills Creek	2,000
A. S. Nichols	July 19	Randolph Creek	2,000
G. F. Edwards	Aug. 7	Gold Lake	6,000
G. V. Redmayne	Aug. 18	Gold Lake	10,000
R. W. Thorne	Aug. 20	Badnock Creek	4,000
R. W. Thorne	Aug. 20	Smith Creek	4,000
R. W. Thorne	Aug. 20	Turner Creek	4,000
		Total	32,000

Distribution of Loch Leven Trout.

A. S. Nichols	July 19	Sierra Mills Creek	6,000
A. S. Nichols	July 19	Randolph Creek	2,000
A. S. Nichols	July 19	Strong Creek	4,000
G. F. Edwards	Aug. 7	Gold Lake	6,000
		Total	18,000

Distribution of Black Spotted Trout.

G. V. Redmayne	Aug. 18	Gold Lake	27,000
R. W. Thorne	Aug. 20	Badnock Creek	6,000
R. W. Thorne	Aug. 20	Smith Creek	6,000
R. W. Thorne	Aug. 20	Turner Creek	6,000
		Total	45,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

SISKIYOU COUNTY.

Distribution of Catfish.

Applicant	Date	Water stocked	Number
W. J. Evans	Sept. 5	Meiss Lake	30
A. Caswell	Sept. 15	Dry Lake	50
		Total	80

Distribution of Black Spotted Trout.

B. Casalta	July 11	Wagon Creek	15,000
H. A. Caldwell and Wm. Falkner	Aug. 18	Beaughan Creek	6,000
H. A. Caldwell and Wm. Falkner	Aug. 18	Eddy Lake	6,000
H. A. Caldwell and Wm. Falkner	Aug. 18	Big Springs	6,000
Montague Gun Club	Aug. 19	Little Shasta	15,000
J. F. Kuck	Aug. 21	Box Canyon	36,000
J. F. Kuck	Aug. 21	Sullaway Creek	30,000
J. F. Kuck	Aug. 21	Spring Creek	16,000
J. F. Kuck	Aug. 21	Keysers Meadows	18,000
McCloud River R. R. Co.	Aug. 25	McCloud River	15,000
McCloud River R. R. Co.	Aug. 26	McCloud River	21,000
McCloud River R. R. Co.	Aug. 27	McCloud River	15,000
McCloud River R. R. Co.	Aug. 28	McCloud River	9,000
Dr. W. B. Mason	Oct. 16	Castle Creek	6,000
Sisson Tavern Co.	Nov. 2	Cold Creek	56,000
		Total	270,000

Distribution of Loch Leven Trout.

B. Casalta	July 11	Wagon Creek	8,000
Zick Abrams	Aug. 17	Abrams Lake	33,000
J. A. McCarton	Aug. 18	Shasta River	4,000
J. A. McCarton	Aug. 18	Beaughan Creek	4,000
H. A. Caldwell and W. Falkner	Aug. 18	Carrick Creek	2,000
H. A. Caldwell and W. Falkner	Aug. 18	Parks Creek	2,000
Montague Gun Club	Aug. 19	Little Shasta	10,000
J. F. Kuck	Aug. 21	Box Canyon	16,000
J. F. Kuck	Aug. 21	Sullaway Creek	10,000
J. F. Kuck	Aug. 21	Keysers Meadows	4,000
John W. Benton	Aug. 25	Butte Creek	8,000
O. E. Pile	Aug. 25	Butte Creek	8,000
McCloud River R. R. Co.	Aug. 25	McCloud River	14,000
McCloud River R. R. Co.	Aug. 26	McCloud River	18,000
McCloud River R. R. Co.	Aug. 27	McCloud River	10,000
McCloud River R. R. Co.	Aug. 28	McCloud River	8,000
F. O. Branstetter	Aug. 29	Sacramento River	16,000
Dr. W. B. Mason	Oct. 16	Castle Creek	4,000
Sisson Tavern Co.	Nov. 2	Cold Creek	45,000
		Total	224,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

SISKIYOU COUNTY.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
B. Casalta	July 11	Wagon Creek	8,000
J. M. Estill	July 19	McCloud River	12,000
C. S. Erickson	July 19	Bear Creek	10,000
Zick Abrams	Aug. 17	Abrams Lake	7,000
J. F. Kuck	Aug. 21	Keysers Meadows	10,000
John W. Benton	Aug. 25	Butte Creek	4,000
O. E. Pile	Aug. 25	Butte Creek	6,000
McCloud River R. R. Co.	Aug. 25	McCloud River	10,000
McCloud River R. R. Co.	Aug 23	McCloud River	10,000
McCloud River R. R. Co.	Aug. 27	McCloud River	8,000
McCloud River R. R. Co.	Aug. 28	Bear Creek	12,000
		Total	97,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
J. A. McCarton	Aug. 18	Parks Creek	4,000
W. J. Bray	Aug. 21	Antelope Creek	20,000
J. F. Kuck	Aug. 21	Spring Creek	4,000
McCloud River R. R. Co.	Aug. 25	McCloud River	6,000
McCloud River R. R. Co.	Aug. 26	McCloud River	8,000
McCloud River R. R. Co.	Aug. 27	McCloud River	10,000
Sisson Tavern Co.	Nov. 2	Cold Creek	30,000
		Total	82,000

Distribution of Silver Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	Aug. 5	Klamath River	12,500

Distribution of Quinnat Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	Mar. 2	Cold Creek, tributary to Sacramento River	1,500,000
Fish and Game Com.	Mar. 15	Cold Creek, tributary to Sacramento River	750,000
Fish and Game Com.	April 1	Sullaway Creek, tributary to Sacramento River	1,150,000
Fish and Game Com.	April 1	Cold Creek, tributary to Sacramento River	350,000
Fish and Game Com.	April 2	Cold Creek, tributary to Sacramento River	550,000
Fish and Game Com.	April 2	Sullaway Creek, tributary to Sacramento River	800,000
Fish and Game Com.	April 3	Cold Creek, tributary to Sacramento River	150,000
Fish and Game Com.	April 4	Cold Creek, tributary to Sacramento River	2,450,000
Fish and Game Com.	April 4	Sullaway Creek, tributary to Sacramento River	350,000
Fish and Game Com.	April 5	Klamath River	830,000
Fish and Game Com.	April 7	Klamath River	350,000
Fish and Game Com.	April 16	Sullaway Creek, tributary to Sacramento River	400,000
Fish and Game Com.	April 16	Klamath River	335,000
Fish and Game Com.	April 18	Klamath River	335,000
Fish and Game Com.	April 19	Cold Creek, tributary to Sacramento River	277,500
Fish and Game Com.	April 28	Cold Creek, tributary to Sacramento River	2,700,000
Fish and Game Com.	April 29	Cold Creek, tributary to Sacramento River	300,000
Fish and Game Com.	April 30	Cold Creek, tributary to Sacramento River	383,000
Fish and Game Com.	May 5	Spring Creek, tributary to Sacramento River	200,000
Fish and Game Com.	May 6	Spring Creek, tributary to Sacramento River	400,000
Fish and Game Com.	May 7	Sullaway Creek, tributary to Sacramento River	200,000
Fish and Game Com.	May 22	Cold Creek, tributary to Sacramento River	139,115
Fish and Game Com.	May 25	Cold Creek, tributary to Sacramento River	300,000
Fish and Game Com.	Sept. 28	Cold Creek, tributary to Sacramento River	2,100,000
Fish and Game Com.	Oct. 6	Spring Creek, tributary to Sacramento River	1,900,000
		Total	19,199,615

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

SOLANO COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Winters Fish and Game Protective Assn.	July 29	Miller Canyon	15,000

Distribution of Quinnat Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	April 2	Straits of Carquinez	350,000
Fish and Game Com.	April 13	Straits of Carquinez	335,000
Fish and Game Com.	April 19	Straits of Carquinez	315,000
Fish and Game Com.	April 24	Straits of Carquinez	330,000
Fish and Game Com.	May 4	Straits of Carquinez	330,000
		Total	1,660,000

SONOMA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
California Anglers' Assn.	July 29	Sonoma Creek	15,000
California Anglers' Assn.	July 29	Stewart Creek	10,000
California Anglers' Assn.	July 29	Graham Creek	12,500
California Anglers' Assn.	July 29	Ahlers Creek	7,500
W. R. Stearns	July 29	Sonoma Creek	20,000
California Anglers' Assn.	Aug. 2	West Austin Creek	25,000
California Anglers' Assn.	Aug. 2	Ward Creek	12,500
California Anglers' Assn.	Aug. 2	Bear Pen Creek	12,500
A. H. Richardson	Aug. 2	Stewarts Point Creek	10,000
		Total	125,000

TEHAMA COUNTY.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
E. G. Powell	July 28	Antelope Creek	8,000
G. W. Vestal	Aug. 1	Mill Creek	6,000
N. I. Boone	Aug. 1	Paynes Creek	4,000
Louis Winter	Sept. 8	Battle Creek	6,000
H. H. Zimmerman	Sept. 24	Mill Creek	4,000
Paul Stoll	Sept. 24	Elder Creek	6,000
J. A. Owens	Oct. 17	South Cottonwood	4,000
		Total	38,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
C. W. DeLong	July 19	Mill Creek	4,000
J. H. Bradley	Aug. 19	South Fork Cottonwood Creek	8,000
H. H. Zimmerman	Sept. 24	Mill Creek	4,000
J. A. Owens	Oct. 17	South Cottonwood	6,000
		Total	22,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
C. W. DeLong	July 19	Mill Creek	6,000
E. G. Powell	July 28	Antelope Creek	6,000
G. W. Vestal	Aug. 1	Mill Creek	4,000
N. I. Boone	Aug. 1	Paynes Creek	4,000
Louis Winter	Sept. 8	Battle Creek	8,000
Paul Stoll	Sept. 24	Elder Creek	4,000
		Total	32,000

TULARE COUNTY.

Distribution of Black Spotted Trout.

Porterville Fish and Game Protective Assn.	Oct. 9	Kessing Creek	4,000
Porterville Fish and Game Protective Assn.	Oct. 9	North Fork South Tule	8,000
Tule River Shooting and Fishing Club	Oct. 9	Tule River	12,000
Tule River Shooting and Fishing Club	Oct. 9	Boulder Creek	3,000
Tule River Shooting and Fishing Club	Oct. 9	Cory Creek	3,000
Doyle Spring Club	Oct. 9	North Fork Middle Tule	9,000
Doyle Spring Club	Oct. 9	Alder Creek	6,000
H. M. Berry	Oct. 9	Poso Creek	12,000
Ed Cramer	Oct. 9	White River	12,000
		Total	69,000

Distribution of Loch Leven Trout.

Wirsh & Oldfield	Aug. 31	Kern River	30,000
Deer Creek Fish and Game Assn.	Oct. 9	South Deer Creek	10,000
Porterville Fish and Game Protective Assn.	Oct. 9	Kessing Creek	2,000
Porterville Fish and Game Protective Assn.	Oct. 9	North Fork South Tule	4,000
Tule River Shooting and Fishing Club	Oct. 9	Tule River	8,000
Tule River Shooting and Fishing Club	Oct. 9	Boulder Creek	4,000
Tule River Shooting and Fishing Club	Oct. 9	Cory Creek	4,000
Doyle Spring Club	Oct. 9	North Fork Middle Tule	4,000
Doyle Spring Club	Oct. 9	Alder Creek	4,000
H. M. Berry	Oct. 9	Poso Creek	6,000
Ed Cramer	Oct. 9	White River	6,000
		Total	82,000

Distribution of Eastern Brook Trout.

Wirsh & Oldfield	Aug. 31	Kern River	10,000
Deer Creek Fish and Game Assn.	Oct. 9	North Deer Creek	8,000
Doyle Spring Club	Oct. 9	North Fork Middle Tule	3,000
Doyle Spring Club	Oct. 9	Alder Creek	3,000
		Total	21,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Wirsh & Oldfield	Aug. 31	Kern River	10,000
Deer Creek Fish and Game Assn.	Oct. 9	South Deer Creek	2,000
Deer Creek Fish and Game Assn.	Oct. 9	North Deer Creek	4,000
		Total	16,000

TUOLUMNE COUNTY.

Distribution of Black Spotted Trout.

Board of Supervisors, Tuolumne County	Aug. 26	Main Stanislaus River	42,000
Board of Supervisors, Tuolumne County	Aug. 26	South Stanislaus River at Strawberry	15,000
Board of Supervisors, Tuolumne County	Aug. 26	North Tuolumne River at Empire Mills	6,000
Board of Supervisors, Tuolumne County	Aug. 26	Sullivans Creek	9,000
		Total	72,000

Distribution of Loch Leven Trout.

Board of Supervisors, Tuolumne County	Aug. 26	Main Stanislaus River	26,000
Board of Supervisors, Tuolumne County	Aug. 26	South Stanislaus River at Strawberry	24,000
Board of Supervisors, Tuolumne County	Aug. 26	North Tuolumne River at Empire Mills	4,000
Board of Supervisors, Tuolumne County	Aug. 26	Five Mile Creek	8,000
Sam E. Redmond	Nov. 12	North Fork of Stanislaus River	2,000
Lewis H. Elliott	Nov. 12	Main Stanislaus River	9,000
Sierra and San Francisco Power Co.	Nov. 12	Indian Creek	2,000
Sierra and San Francisco Power Co.	Nov. 12	Reservoir, Power House	6,000
		Total	81,000

Distribution of Rainbow Trout.

Board of Supervisors, Tuolumne County	Aug. 26	Main Stanislaus River	8,000
Board of Supervisors, Tuolumne County	Aug. 26	South Stanislaus River at Strawberry	10,000
Board of Supervisors, Tuolumne County	Aug. 26	North Tuolumne River at Empire Mills	8,000
Board of Supervisors, Tuolumne County	Aug. 26	Tuolumne Creek	4,000
A. W. Stewart	Aug. 26	Cow Creek	4,000
Sam E. Redmond	Nov. 12	North Fork Stanislaus River	2,000
		Total	36,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Board of Supervisors, Tuolumne County	Aug. 26	Main Stanislaus River	16,000
Board of Supervisors, Tuolumne County	Aug. 26	South Stanislaus River at Strawberry	4,000
Board of Supervisors, Tuolumne County	Aug. 26	Sullivans Creek	6,000
Board of Supervisors, Tuolumne County	Aug. 26	Shaws Flat Creek	4,000
Board of Supervisors, Tuolumne County	Aug. 26	Tuolumne Creek	4,000
Board of Supervisors, Tuolumne County	Aug. 26	Five Mile Creek	8,000
Board of Supervisors, Tuolumne County	Aug. 26	Clark Stream	10,000
A. W. Stewart	Aug. 26	Cow Creek	4,000
Lewis H. Elliott	Nov. 12	Main Stanislaus River	9,000
Sierra and San Francisco Power Co.	Nov. 12	Indian Creek	2,000
Sierra and San Francisco Power Co.	Nov. 12	Clarks Fork	4,000
Sierra and San Francisco Power Co.	Nov. 12	Middle Fork Stanislaus River	2,000
		Total	73,000

VENTURA COUNTY.

Distribution of Quinnat Salmon.

Applicant	Date	Water stocked	Number
J. J. Barnett	July 14	Ventura River	10,000
J. J. Barnett	July 14	San Antonio Creek	8,000
J. J. Barnett	July 14	Coyote Creek	6,000
		Total	24,000

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
R. L. Poplin	July 14	Santa Paula Creek	12,000
J. J. Barnett	July 14	Ventura River	52,000
J. J. Barnett	July 14	San Antonio Creek	8,000
J. J. Barnett	July 14	North Fork Creek	15,000
J. J. Barnett	July 14	Conejo Creek	15,000
S. M. Mosher	Oct. 29	Sespee Creek	39,000
G. C. Hollister	Oct. 29	Agua Blanca	18,000
A. M. Meyer	Oct. 29	Borchard Creek	3,000
A. M. Meyer	Oct. 29	Sycamore Creek	3,000
		Total	165,000

YOLO COUNTY.

Distribution of Black Bass.

Applicant	Date	Water stocked	Number
M. H. Stitt	Aug. 28	Cache Creek	50

YUBA COUNTY.

Distribution of Black Bass.

Applicant	Date	Water stocked	Number
Dr. L. L. Kimerer	Nov. 16	Middle Dry Creek	32
Dr. L. L. Kimerer	Nov. 16	Lower Dry Creek	37
		Total	69

TAHOE HATCHERY.

Fish Distribution by Counties. Season 1914.

EL DORADO COUNTY.

Distribution of Black Spotted Trout.

Carl Fluegge	June 23	Green Bay, Fallen Leaf Lake	60,000
Tait and Mann	June 23	Taylor Creek	60,000
Carl Fluegge	June 25	Green Bay, Fallen Leaf Lake	60,000
Carl Fluegge	June 27	Taylor Creek	30,000
Carl Fluegge	June 27	Power House Ditch	30,000
J. C. Copeland	June 28	Eagle Lake	30,000
J. C. Copeland	June 28	Power House Ditch	15,000
Carl Fluegge	June 29	Green Bay, Fallen Leaf Lake	40,000
Carl Fluegge	June 29	Power House Ditch	15,000
Tait and Mann	June 30	Taylor Creek	40,000
Tait and Mann	July 2	Power House Ditch	30,000
Tait and Mann	July 2	Taylor Creek	50,000
Tait and Mann	July 2	Cascade Lake	60,000
Tait and Mann	July 5	Taylor Creek	110,000
Tait and Mann	July 5	Tallac Creek	70,000
Tait and Mann	July 6	Tallac Creek	90,000
Tait and Mann	July 6	Power House Ditch	20,000
Bert Granlees	July 6	Flourney Creek	50,000
Bert Granlees	July 7	Taylor Creek	70,000
Carl Fluegge	June 8	Green Bay, Fallen Leaf Lake	50,000
Carl Fluegge	July 8	Power House Ditch	70,000
Bert Granlees	July 8	Little Truckee River, tributary to Lake Tahoe	70,000
Tait and Mann	July 9	Tallac Creek	120,000
Tait and Mann	July 9	Taylor Creek	35,000
Tait and Mann	July 10	Power House Ditch	70,000
Tait and Mann	July 10	Taylor Creek	65,000
Glen Alpine Co.	July 20	Grass Lake	44,500
Glen Alpine Co.	July 21	Susie Lake	44,500
Glen Alpine Co.	July 22	Gilmore Lake	44,500
J. C. Copeland	July 25	Eagle Lake	30,000
A. Richardson	July 30	Little Truckee River, tributary to Lake Tahoe	40,000
Glen Alpine Co.	July 31	Half Moon Lake	44,500
Glen Alpine Co.	Aug. 1	Grass Lake	44,500
Glen Alpine Co.	Aug. 2	Heather Lake	44,500
Glen Alpine Co.	Aug. 3	Gilmore Lake	44,500
Glen Alpine Co.	Aug. 4	Susie Lake	44,500
Glen Alpine Co.	Aug. 4	Glen Alpine Creek	44,500
Tahoe Tavern Co.	Sept. 14	Meeks Creek	30,000
		Total	1,910,500

Distribution of Large Lake Trout.

Tait and Mann	July 26	Taylor Creek	15,000
Tait and Mann	July 30	Taylor Creek	8,000
A. Richardson	July 30	Little Truckee River, tributary to Lake Tahoe	37,000
A. Richardson	July 30	Power House Ditch	6,000
Tahoe Tavern Co.	Sept. 14	Meeks Bay	5,000
		Total	71,000

TAHOE HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

NEVADA COUNTY.

Distribution of Black Spotted Trout.

Truckee Chamber of Com.	Aug. 30	Donner Lake	125,000
Mrs. Geo. W. Kenney	Aug. 31	Lake Independence	50,000
H. M. Freeman	Sept. 14	Lake Sterling	40,000
		Total	215,000

Distribution of Large Lake Trout.

H. M. Freeman	Sept. 14	Lake Sterling	8,000

PLACER COUNTY.

Distribution of Large Lake Trout.

Tahoe Tavern Co.	Aug. 13	Ward Creek	5,000
Tahoe Tavern Co.	Aug. 26	Blackwood Creek	5,000
Tahoe Tavern Co.	Sept. 5	Blackwood Creek	5,000
Tahoe Tavern Co.	Sept. 15	Slim Jim Creek	6,500
		Total	21,500

Distribution of Black Spotted Trout.

Tahoe Tavern Co.	Aug. 11	Slim Jim Creek	50,000
Tahoe Tavern Co.	Aug. 13	Ward Creek	60,000
Tahoe Tavern Co.	Aug. 14	Rock Creek	55,000
F. H. Walker	Aug. 18	New Burton Creek	60,000
Tahoe Tavern Co.	Aug. 26	Blackwood Creek	50,000
Tahoe Tavern Co.	Aug. 27	Rock Creek	40,000
Tahoe Vista Imp. Co.	Sept. 3	Griffen Creek	45,000
Murphy Bros. & Morgan	Sept. 4	McKinney Creek	50,000
Tahoe Tavern Co.	Sept. 5	Blackwood Creek	40,000
Tahoe Tavern Co.	Sept. 7	General Phipps Creek	50,000
Tahoe Tavern Co.	Sept. 8	Ward Creek	60,000
Tahoe Tavern Co.	Sept. 15	Slim Jim Creek	32,000
		Total	592,000

SIERRA COUNTY.

Distribution of Black Spotted Trout.

W. C. Murdock	Aug. 26, 27, 28	Webber Lake	100,000
Mrs. Geo. Kenney	Sept. 1	Lake Independence	50,000
		Total	150,000

Distribution of Large Lake Trout.

W. C. Murdock	Aug. 26, 27, 28	Webber Lake	10,000

PRICE CREEK HATCHERY.

Fish Distribution by Counties. Season 1914.

HUMBOLDT COUNTY.

Distribution of Quinnat Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	Feb. 7	Price Creek	100,000
Fish and Game Com.	Feb. 9	Price Creek	155,000
Fish and Game Com.	Feb. 10	Price Creek	120,000
Fish and Game Com.	Feb. 11	Eel River	210,000
Fish and Game Com.	Feb. 13	Eel River	183,000
Fish and Game Com.	Feb. 14	Eel River	240,000
Fish and Game Com.	Feb. 15	Eel River	220,000
Fish and Game Com.	Feb. 16	Eel River	170,000
Fish and Game Com.	Feb. 18	Price Creek	280,000
Fish and Game Com.	Feb. 19	Price Creek	200,000
Fish and Game Com.	Feb. 20	Price Creek	400,000
Fish and Game Com.	Feb. 26	Price Creek	100,000
Fish and Game Com.	Mar. 6	Price Creek	42,610
Fish and Game Com.	Mar. 7	Price Creek	100,000
Fish and Game Com.	Mar. 8	Price Creek	167,850
Fish and Game Com.	Mar. 9	Price Creek	26,805
Fish and Game Com.	Mar. 10	Price Creek	27,235
Fish and Game Com.	Mar. 10	Eel River	140,000
Arcata Chamber of Com.	Mar. 27	Mad River	75,000
Harbor Commissioners	Mar. 31	Freshwater Creek, tributary to Humboldt Bay	37,500
Eureka Chamber of Com.	Mar. 31	Jacoby Creek, tributary to Humboldt Bay	37,500
Arcata Chamber of Com.	April 4	Mad River	75,000
Arcata Chamber of Com.	April 7	Mad River	75,000
Fish and Game Com.	April 10	Eel River	691,000
Eureka Chamber of Com.	April 10	Elk River, tributary to Humboldt Bay	75,000
		Total	3,948,000

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Harbor Commission	April 29	Jacoby Creek	37,500
Harbor Commission	April 29	Freshwater Creek	37,500
Harbor Commission	April 30	Elk River	75,000
Arcata Chamber of Com.	May 5	Mad River	50,000
Fish and Game Com.	May 6	Price Creek and Eel River	206,000
		Total	406,000

UKIAH HATCHERY.

Fish Distribution by Counties. Season 1914.

MENDOCINO COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Fish and Game Com.	July 7	Eel River	100,000
Mendocino State Hospital	July 9	South Mill Creek	40,000
Cox & Halliday	July 11	Reeves Mill Creek	50,000
B. J. Reilly	July 20	Russian River	35,000
A. P. Weger	July 21	Big River at Orrs Springs	50,000
L. Gobbe	July 23	Cunningham Creek	20,000
W. P. Burke	July 24	Feliz Creek	50,000
Robt. Jones	July 28	Sulphur Creek	20,000
B. M. Bucknell	July 29	Robinson Creek	50,000
Clare Smith	July 30	Cold Creek	14,583
		Total	429,583

TAHOE HATCHERY—Continued.

Fish Distribution by Counties. Season 1914.

SONOMA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
J. M. Alexander	July 14	Warm Spring Creek	30,000
J. M. Alexander	July 14	Mill Creek	35,000
J. M. Alexander	July 14	Little Sulphur Creek	35,000
		Total	100,000

WAWONA HATCHERY.

Fish Distribution by Counties. Season 1914.

MADERA COUNTY.

Distribution of Large Lake Trout.

Fish and Game Com.	July 19	Raynor Creek	6,000

Distribution of Black Spotted Trout.

Fish and Game Com.	July 19	Big Creek	18,000
Fish and Game Com.	July 20	Big Creek	18,000
Fish and Game Com.	July 21	Raynor Creek	14,000
Fish and Game Com.	July 23	Sugar Pine Mill Creek	8,000
Fish and Game Com.	July 27	Big Tree Creek	12,000
		Total	70,000

MARIPOSA COUNTY.

Distribution of Large Lake Trout.

Fish and Game Com.	July 22	Headwaters of Meadow Creek	5,000
Fish and Game Com.	July 24	Small Bridal Veil Creek	10,000
		Total	15,000

Distribution of Black Spotted Trout.

Fish and Game Com.	July 15	Meadow Creek	18,000
Fish and Game Com.	July 16	Headwaters of Miami Creek	3,000
Fish and Game Com.	July 16	Chilnualna Creek	12,000
Fish and Game Com.	July 16	Bruce Creek	6,000
Fish and Game Com.	July 17	Stella Lake	22,000
Fish and Game Com.	July 18	Merced River	25,000
Fish and Game Com.	July 22	Headwaters of Meadow Creek	8,000
Fish and Game Com.	July 24	Small Bridal Veil Creek	6,000
Fish and Game Com.	July 25	Big Creek	9,000
Fish and Game Com.	July 25	Laurel Creek	6,000
Fish and Game Com.	July 26	Merced River	18,000
Fish and Game Com.	July 27	Brush Creek	12,000
		Total	145,000

SISSON HATCHERY.

Fish Distribution by Counties. Season 1915.

ALAMEDA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Earle Downing	June 9	Apperson Creek	8,000
Earle Downing	June 9	Bachelor Canyon	8,000
Earle Downing	June 9	Arbrott Creek	8,000
Earle Downing	June 9	Indian Creek	12,000
Earle Downing	June 9	La Costa Creek, headwaters	24,000
Earle Downing	June 9	La Costa Creek, Shakers Vineyard	12,000
Earle Downing	June 9	Calaveras Creek	10,000
Earle Downing	June 9	Alameda Creek, above Calaveras Creek	20,000
Earle Downing	June 9	Mocho Creek, headwaters	12,000
Earle Downing	June 9	Mocho Creek, above Wilson Creek	8,000
Earle Downing	June 9	Trout Creek	12,000
Earle Downing	June 9	Arroyo Bayou	8,000
Earle Downing	June 9	Acker Creek, small stream tributary to Bayou	8,000
Earle Downing	June 9	Another small creek	2,000
Earle Downing	June 9	Kaiser Creek	24,000
Earle Downing	June 9	North Branch of Dry Creek	8,000
Earle Downing	June 9	San Lorenzo Creek	32,000
Earle Downing	June 9	Palomares Creek	64,000
Earle Downing	June 9	Crow Creek	40,000
Earle Downing	June 9	Bellinas Creek	12,000
Earle Downing	June 9	Goulardt Creek	4,000
Earle Downing	June 9	Ivory Creek	4,000
Earle Downing	June 9	Small stream by Brushy Peak	4,000
Earle Downing	June 9	Stony Brook	12,000
Earle Downing	June 9	Alameda Creek	8,000
Earle Downing	June 9	Arroyo Bayou, between Sunol and Pleasanton	8,000
Earle Downing	June 9	South Fork of Dry Creek	8,000
		Total	380,000

ALPINE COUNTY.

Distribution of Loch Leven Trout.

Chas. W. Tryon	Aug. 17	Highland Lakes	10,000

AMADOR COUNTY.

Distribution of Steelhead Trout.

Sutter Creek Fish Club	July 27	Sutter Creek	6,000
F. V. Rocca	July 27	Silver Lake	15,000
		Total	21,000

Distribution of Loch Leven Trout.

Women's Improvement Club of Jackson	July 27	Silver Lake	10,000
F. V. Rocca	July 27	Silver Lake	10,000
		Total	20,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Women's Improvement Club of Jackson	July 27	Silver Lake	10,000
Sutter Creek Fish Club	July 27	Sutter Creek	10,000
		Total	20,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Sutter Creek Fish Club	July 27	Sutter Creek	21,000

BUTTE COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
A. J. Williams	Aug. 26	Clear Creek	6,000
A. J. Williams	Aug. 26	Berry Creek	6,000
Dr. P. H. Dunbar	Aug. 26	Big Kimshew and tributaries	20,000
Clay Buchanan	Aug. 26	Big Kimshew and tributaries	20,000
A. C. Musselman	Aug. 26	Little Butte Creek	7,500
A. C. Musselman	Aug. 26	Mosquito Creek	2,500
		Total	62,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
W. H. King	June 13	Flea Valley Creek	8,000
W. H. King	June 13	Camp Creek	2,000
W. H. King	June 13	North Fork of Feather River	2,000
J. C. Carter	June 12	Big Chico Creek	18,000
J. H. Richardson	June 12	Mud Creek	9,000
A. J. Stanley	Aug. 26	Little Butte Creek	10,000
		Total	49,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
W. H. King	July 21	Flea Valley Creek	5,000
W. H. King	July 21	Camp Creek	3,000
W. H. King	July 21	Mill Creek	3,000
W. H. King	July 21	Dogwood Creek	3,000
W. H. King	July 21	North Fork of Feather River	4,000
Dr. P. H. Dunbar	Aug. 26	Big Kimshew and tributaries	21,000
Clay Buchanan	Aug. 26	Big Kimshew and tributaries	20,000
A. C. Musselman	Aug. 26	Big Butte Creek	4,000
A. C. Musselman	Aug. 26	Little Butte Creek	4,000
A. C. Musselman	Aug. 26	Mosquito Creek	2,000
A. J. Stanley	Aug. 26	Little Butte Creek	4,000
A. J. Stanley	Aug. 26	West Branch of Feather River	10,000
		Total	86,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
W. H. King	June 18	Flea Valley Creek	3,000
W. H. King	June 18	Camp Creek	1,000
W. H. King	June 18	North Fork of Feather River	2,000
J. C. Carter	June 12	Big Chico Creek	18,000
J. H. Richardson	June 12	Mud Creek	9,000
A. J. Williams	Aug. 26	Clear Creek	2,000
A. J. Williams	Aug. 26	Berry Creek	2,000
Clay Buchanan	Aug. 26	Big Kimshew and tributaries	10,000
A. C. Musselman	Aug. 26	Little Butte Creek	6,000
		Total	53,000

Distribution of Black Spotted Trout.

W. C. Peachy	Sept. 23	North Fork of Feather River	10,000

CALAVERAS COUNTY.

Distribution of Steelhead Trout.

Board of Supervisors of Calaveras County	July 27	North Fork of Mokelumne River	30,000
Board of Supervisors of Calaveras County	July 27	South Fork of Mokelumne River	36,000
Board of Supervisors of Calaveras County	July 27	Licking Fork of Mokelumne River	12,000
Board of Supervisors of Calaveras County	July 27	Middle Fork of Mokelumne River and tributary to Middle Fork	45,000
M. P. Avery	Sept. 9	Stanislaus River at Ramsays	6,000
M. P. Avery	Sept. 9	San Antone Creek at Hodges	4,000
S. E. Redmond	Sept. 9	Big Meadow Creek	4,000
S. E. Redmond	Sept. 9	Upper Stanislaus River	8,000
Sierra and S. F. Power Co.	Sept. 9	Clarks Flat Creek	7,000
Ben Stephens	Sept. 9	San Antone Creek	3,000
Ben Stephens	Sept. 9	O'Neals Creek	3,000
Board of Supervisors of Calaveras County	Sept. 14	San Antone Creek at Dunbar Crossing	2,000
Board of Supervisors of Calaveras County	Sept. 14	Rattlesnake Creek	4,000
Board of Supervisors of Calaveras County	Sept. 14	Stanislaus River	20,000
Board of Supervisors of Calaveras County	Sept. 14	Love Creek	8,000
Board of Supervisors of Calaveras County	Sept. 14	Moran Creek	12,000
Board of Supervisors of Calaveras County	Sept. 14	Peppermint Creek	8,000
Board of Supervisors of Calaveras County	Sept. 14	Murphy's Creek	16,000
		Total	228,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Board of Supervisors of Calaveras County	July 27	North Fork of Mokelumne River	7,500
Board of Supervisors of Calaveras County	July 27	Middle Fork of Mokelumne River and tributary to Middle Fork	12,500
Ben Stephens	Sept. 9	San Antone Creek	2,000
Ben Stephens	Sept. 9	O'Neals Creek	2,000
		Total	24,000

Distribution of Rainbow Trout.

Board of Supervisors of Calaveras County	July 27	North Fork of Mokelumne River	21,000
Board of Supervisors of Calaveras County	July 27	South Fork of Mokelumne River	24,000
Board of Supervisors of Calaveras County	July 27	Licking Fork of Mokelumne River	6,000
Board of Supervisors of Calaveras County	July 27	Middle Fork of Mokelumne River and tributary to Middle Fork	12,000
M. P. Avery	Sept. 9	Stanislaus River at Ramsays	4,000
M. P. Avery	Sept. 9	San Antone Creek at Hodges	2,000
S. E. Redmond	Sept. 9	Upper San Antone Creek	4,000
Ben Stephens	Sept. 9	San Antone Creek	2,000
Ben Stephens	Sept. 9	O'Neals Creek	2,000
Board of Supervisors of Calaveras County	Sept. 14	Sand Meadow	10,000
Board of Supervisors of Calaveras County	Sept. 14	Mill Creek	10,000
Board of Supervisors of Calaveras County	Sept. 14	Beaver Creek	10,000
		Total	107,000

COLUSA COUNTY.

Distribution of Loch Leven Trout.

B. H. Mace	July 21	Little Stony Creek	6,000
B. H. Mace	July 21	Big Stony Creek	17,000
		Total	23,000

Distribution of Eastern Brook Trout.

B. H. Mace	July 21	Mill Creek	3,000
B. H. Mace	July 21	Little Stony Creek	3,000
B. H. Mace	July 21	Big Stony Creek	9,000
		Total	15,000

Distribution of Rainbow Trout.

B. H. Mace	July 21	Mill Creek	3,000
B. H. Mace	July 21	Big Stony Creek	8,000
		Total	11,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

CONTRA COSTA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Earle Downing	June 9	Morris Canyon	8,000
Earle Downing	July 21	San Ramon Valley Creek	18,000
Earle Downing	July 21	San Ramon	6,000
Earle Downing	July 21	Walnut Creek	6,000
Earle Downing	July 21	Mitchel Canyon	9,000
		Total	47,000

EL DORADO COUNTY.

Distribution of Bass.

F. G. Warner	Aug. 21	North Fork of Cosumnes River	26

Distribution of Steelhead Trout.

El Dorado County Rod and Gun Club	Aug. 15	Middle Fork of American River	85,000
George Neale	July 13	South Fork of American River at Salmon Falls	105,000
George Neale	July 13	South Fork of Amer. River at Mormon Island	66,000
George Neale	July 13	Main River at Prison, above dam	9,000
El Dorado County Rod and Gun Club	Aug. 22	South Canyon, Iowa Canyon	17,500
El Dorado County Rod and Gun Club	Aug. 22	Middle Fork of Cosumnes River	25,000
El Dorado County Rod and Gun Club	Aug. 22	North and Middle Cosumnes	12,500
El Dorado County Rod and Gun Club	Aug. 22	Steeley Fork of Cosumnes River	10,000
El Dorado County Rod and Gun Club	Aug. 22	Big Silver Creek	35,000
El Dorado County Rod and Gun Club	Aug. 21	Middle Fork of Cosumnes River and tributaries	75,000
North Fork Game Protective Association	Sept. 21	Rock Creek	4,000
North Fork Game Protective Association	Sept. 24	Otter Creek	6,000
North Fork Game Protective Association	Sept. 24	Canyon Creek	2,000
		Total	452,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
El Dorado County Rod and Gun Club	Aug. 15	Middle Fork of American River	26,000
Chas. Edner	Aug. 15	Little South Fork of Cosumnes River	4,000
George Neale	July 18	Middle Fork of Cosumnes River	6,000
George Neale	July 13	Scott Creek	2,000
El Dorado County Rod and Gun Club	Aug. 22	Rock Creek	16,000
El Dorado County Rod and Gun Club	Aug. 22	Middle Fork of Cosumnes River	4,000
El Dorado County Rod and Gun Club	Aug. 29	Park Creek	6,000
North Fork Game Protective Association	Sept. 4	Rock Creek	2,000
F. J. Pomin	Sept. 16	Canyon Creek	8,000
Glen Alpine Springs	Sept. 16	Grass Lake	5,000
Glen Alpine Springs	Sept. 16	Heather Lake	5,000
Glen Alpine Springs	Sept. 16	Susie Lake	5,000
Glen Alpine Springs	Sept. 16	Half Moon Lake	5,000
Hotel Tallac	Sept. 22	Taylor Creek	2,000
Hotel Tallac	Sept. 22	Cascade Creek	2,000
N. L. Salter	Sept. 22	Eagle Lake	4,000
N. L. Salter	Sept. 22	Eagle Creek	4,000
		Total	106,000

Distribution of Rainbow Trout.

El Dorado County Rod and Gun Club	Aug. 15	Middle Fork of American River	58,000
El Dorado County Rod and Gun Club	Aug. 22	Whaler and Gadis Creek	16,000
El Dorado County Rod and Gun Club	Aug. 22	Whaler and One Eye Creek	14,000
El Dorado County Rod and Gun Club	Aug. 22	North and Middle Forks of Cosumnes River	20,000
El Dorado County Rod and Gun Club	Aug. 29	Camp Creek	12,000
El Dorado County Rod and Gun Club	Aug. 29	American River	68,000
North Fork Game Protective Association	Sept. 4	Greenwood Creek	2,000
North Fork Game Protective Association	Sept. 4	Rock Creek	2,000
North Fork Game Protective Association	Sept. 4	Canyon Creek	6,000
F. J. Pomin	Sept. 16	Richardson Lake	8,000
James Bryson	Sept. 16	Headwaters of South Fork of American River	6,000
R. Colwell	Sept. 16	Rubicon River	2,000
R. Colwell	Sept. 16	Rock Bound Lake	6,000
Hotel Tallac	Sept. 22	Angora Lakes	4,000
Hotel Tallac	Sept. 22	Taylor Creek	4,000
Hotel Tallac	Sept. 22	Cascade Creek	2,000
Murphy & Morgan	Sept. 22	Duck Creek	8,000
E. S. Schmidell	Sept. 22	Rubicon River	6,000
		Total	244,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
El Dorado County Rod and Gun Club	Aug. 15	Middle Fork of American River	26,000
F. J. Pomin	Sept. 16	Richardson Lake	4,000
James Bryson	Sept. 16	Headwaters of South Fork of American River	6,000
R. Colwell	Sept. 16	Rock Bound Lake	4,000
C. P. Winchell	Sept. 22	Little Truckee River	1,500
C. P. Winchell	Sept. 22	Echo Lake	1,500
C. P. Winchell	Sept. 22	Audrain Lake	1,500
C. P. Winchell	Sept. 22	American River	8,000
C. P. Winchell	Sept. 22	Pyramid Creek	1,500
Hotel Tallac	Sept. 22	Tallac Creek	4,000
Murphy & Morgan	Sept. 22	Duck Creek	4,000
N. L. Salter	Sept. 22	Eagle Creek	1,000
N. L. Salter	Sept. 22	Eagle Lake	1,000
E. S. Schmidell	Sept. 22	Rabbit Lake	4,000
		Total	68,000

FRESNO COUNTY.

Distribution of Loch Leven Trout.

San Joaquin and Eastern Railroad	Sept. 19	Huntington Lake	100,000

Distribution of Rainbow Trout.

Shaver Lake Fishing Club	Sept. 18	Bacon Creek, tributary to Shaver Lake	20,000
San Joaquin and Eastern Railroad	Sept. 19	Stevenson Creek	6,000
San Joaquin and Eastern Railroad	Sept. 19	Huntington Lake	30,000
San Joaquin and Eastern Railroad	Sept. 19	Huntington Lake and tributaries	40,000
W. H. Thrower	Sept. 19	Balsam Creek	4,000
W. H. Thrower	Sept. 19	Alder Creek	2,000
W. H. Thrower	Sept. 19	Pitman Creek	4,000
		Total	106,000

GLENN COUNTY.

Distribution of Loch Leven Trout.

B. H. Mace	July 21	Brisco Creek	15,000
B. H. Mace	July 21	South Fork of Elk Creek	5,000
B. H. Mace	July 21	Grindstone Creek	17,000
B. H. Mace	July 21	Salt Creek	13,000
		Total	50,000

Distribution of Eastern Brook Trout.

B. H. Mace	July 21	Salt Creek	20,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
B. H. Mace	July 21	Brisco Creek	7,000
B. H. Mace	July 21	South Fork of Elk Creek	4,000
B. H. Mace	July 21	Cold Creek	25,000
B. H. Mace	July 21	Grindstone Creek	12,000
		Total	48,000

INYO COUNTY.

Distribution of Black Spotted Trout.

Mount Whitney Gun and Anglers' Club	July 28	Haiwee Reservoir	15,000

Distribution of Loch Leven Trout.

Dick Eldred	July 28	Bishop Creek, South Fork	6,000
Hall & McAfee	July 28	Big Pine Creek	8,000
Mount Whitney Gun and Anglers' Club	July 28	Lubken Creek	4,000
Mount Whitney Gun and Anglers' Club	July 28	Tuttle Creek	4,000
Mount Whitney Gun and Anglers' Club	July 28	Lone Pine Creek	2,000
D. M. Nicoll	July 28	Olancha Creek	4,000
D. M. Nicoll	July 28	Shepherds Creek	4,000
D. M. Nicoll	July 28	Walker Creek	1,000
D. M. Nicoll	July 28	Olancha Creek	3,000
		Total	36,000

Distribution of Eastern Brook Trout.

Dick Eldred	July 28	Bishop Creek, North Fork	12,000
Hall & McAfee	July 28	Big Pine Creek	8,000
Mount Whitney Gun and Anglers' Club	July 28	Lubken Creek	4,000
Mount Whitney Gun and Anglers' Club	July 28	Tuttle Creek	4,000
Mount Whitney Gun and Anglers' Club	July 28	Lone Pine Creek	6,000
Mount Whitney Gun and Anglers' Club	July 28	Mirror Lake	6,000
Mount Whitney Gun and Anglers' Club	July 28	Consultation Lake	6,000
Mount Whitney Gun and Anglers' Club	July 28	Headwaters of Lone Pine Creek	8,000
Mount Whitney Gun and Anglers' Club	July 28	Bair Creek	6,000
D. M. Nicoll	July 28	Olancha Creek	4,000
D. M. Nicoll	July 28	Shepherds Creek	4,000
Carl Walters	July 28	Thieban Creek	4,000
Carl Walters	July 28	Lake at head of South Fork of Oak Creek	4,000
D. M. Nicoll	July 28	Walker Creek	1,000
D. M. Nicoll	July 28	Olancha Creek	3,000
Clyde Allen	July 28	Goodale Creek	2,000
Clyde Allen	July 28	Taboose Creek	2,000
		Total	84,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Dick Eldred	July 28	Bishop Creek at Andrews Camp	5,000
Hall & McAfee	July 28	Tinemaha Creek	5,000
Hall & McAfee	July 28	Big Pine Creek	5,000
Carl Walters	July 28	Syms Creek	5,000
Carl Walters	July 28	Charles Creek	2,500
Carl Walters	July 28	Little Onion Valley, South Fork of Oak Creek	2,500
Clyde Allen	July 28	Goodale Creek	2,000
Clyde Allen	July 28	Taboose Creek	2,500
		Total	30,000

KERN COUNTY.

Distribution of Perch.

Arthur S. Crites	Oct. 12	Kern River	800

Distribution of Bass.

Arthur S. Crites	Oct. 12	Kern River	218

Distribution of Steelhead Trout.

Kern River Trout Club	Sept. 8	Cedar Creek	12,000
R. R. Martin	Sept. 8	Lumro Creek	4,500
F. G. Munzer	Sept. 8	Kern River	40,000
G. G. McKay	Sept. 8	Basin Creek	8,000
Arthur S. Crites	Oct. 5	Indian Creek	6,000
		Total	70,500

Distribution of Loch Leven Trout.

Kern River Trout Club	Sept. 8	Cedar Creek	12,000
Ed Tibbett	Sept. 8	McFarland Creek	6,000
		Total	18,000

Distribution of Rainbow Trout.

Kern River Trout Club	Sept. 8	Cedar Creek	12,000
R. R. Martin	Sept. 8	Lumro Creek	4,500
Ed Tibbett	Sept. 8	McFarland Creek	6,000
F. G. Munzer	Sept. 8	Kern River	10,000
Arp & Kaye	Sept. 9	Oak Creek	4,000
W. W. Laidley	Oct. 5	Cedar Creek	2,000
Al Cummings	Oct. 13	Cummings Reservoir	8,000
		Total	46,500

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

LAKE COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Mrs. Geo. Farley	Sept. 27	Alder Creek	5,000
Mrs. Geo. Farley	Sept. 27	Kelsey Creek	5,000
Mrs. Geo. Fields	Sept. 27	Kelsey Creek	5,000
Mrs. Geo. Fields	Sept. 27	Jones Creek	5,000
		Total	20,000

Distribution of Loch Leven Trout.

Allen Springs Co.	Sept. 27	Allen Creek	8,000

Distribution of Eastern Brook Trout.

Mrs. Geo. Farley	Sept. 27	Alder Creek	3,000
Mrs. Geo. Farley	Sept. 27	Kelsey Creek	3,000
Mrs. Geo. Fields	Sept. 27	Houten Creek	6,000
		Total	12,000

Distribution of Rainbow Trout.

Allen Springs Co.	Sept. 27	Allen Creek	8,000

LASSEN COUNTY.

Distribution of Blue Catfish.

F. A. Marsh	July 21	Tule Lake, 5 miles north of Plumas Junction	48

Distribution of Steelhead Trout.

F. D. Hall	Sept. 24	Willow Creek	8,000
Red River Lumber Co.	Sept. 24	Feather River	8,000
Frank P. Cady	Sept. 24	Susan River	10,000
Fish and Game Com.	Oct. 15	Juniper Lake	25,000
		Total	51,000

Distribution of Loch Leven Trout.

W. R. Horne	July 21	Smoke Creek	2,000
Red River Lumber Co.	Sept. 24	Clear Creek	10,000
Frank P. Cady	Sept. 24	Eagle Lake	16,000
Frank P. Cady	Sept. 24	Susan River	4,000
		Total	32,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Homer C. Jack	July 21	Willow Creek	4,000
T. J. Dunlap	July 21	Ash Creek	6,000
		Total	10,000

Distribution of Rainbow Trout.

W. R. Horne	July 21	Smoke Creek	6,000
Homer C. Jack	July 21	Willow Creek	4,000
T. J. Dunlap	July 21	Ash Creek	2,000
F. D. Hall	Sept. 24	Willow Creek	8,000
Red River Lumber Co.	Sept. 24	Robbers Creek	10,000
Red River Lumber Co.	Sept. 24	Feather River	2,000
Frank P. Cady	Sept. 24	Susan River	10,000
		Total	42,000

LOS ANGELES COUNTY.

Distribution of Bass.

Mrs. Frankes	Oct. 6	Elizabeth Lake	30

Distribution of Steelhead Trout.

Geo. E. Little	Oct. 13	Rio Hondo	6,000
H. I. Pritchard	Oct. 13	Topango Canyon	8,000
A. Adams, Jr.	Oct. 13	Big Tujunga	4,000
H. W. O'Melveny	Oct. 22	San Gabriel River	60,000
		Total	78,000

Distribution of Loch Leven Trout.

H. W. O'Melveny	Oct. 6	San Gabriel River	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River, east fork	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River, north fork	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, west fork	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Bear Canyon	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Cattle Canyon	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Soldier Creek	4,000
		Total	30,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
G. L. Baker	Oct. 7	Santa Anita River	2,000
Hurbert T. Mills	Oct. 6	San Dimas Canyon	4,000
H. W. O'Melveny	Oct. 6	San Gabriel River	16,000
H. W. O'Melveny	Oct. 6	San Gabriel River, east fork	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, north fork	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, west fork	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Bear Canyon	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Cattle Canyon	6,000
H. W. O'Melveny	Oct. 6	San Gabriel River, Soldier Creek	6,000
T. J. Opid	Oct. 6	Rocky Gulch of west fork of San Gabriel River	2,000
T. J. Opid	Oct. 6	West Fork of San Gabriel River	2,000
E. De Vor	Oct. 6	West Fork of San Gabriel River	6,000
A. Adams, Jr.	Oct. 18	Big Tujunga	16,000
		Total	84,000

MADERA COUNTY.

Distribution of Rainbow Trout.

A. D. Ferguson	Sept. 3	North Fork San Joaquin River	26,000

MARIN COUNTY.

Distribution of Steelhead Trout.

California Anglers' Assn.	Aug. 21	Lake Lagunitas	90,000
California Anglers' Assn.	Aug. 21	San Geronimo Creek	35,000
California Anglers' Assn.	Aug. 21	Paper Mill Creek	75,000
California Anglers' Assn.	Aug. 21	Olema Creek	50,000
W. G. Domerque	Sept. 27	Steep Ravine	25,000
W. G. Domerque	Sept. 27	Muir Woods	25,000
		Total	300,000

MARIPOSA COUNTY.

Distribution of Rainbow Trout.

Edwin T. Huffman	Sept. 3	Miami Creek	10,000
Yosemite Valley R. R. Co.	Sept. 30	Merced River, from Busburg to El Portal	56,000
C. B. Hollingsworth	Sept. 30	Cascade Creek	4,000
		Total	70,000

Distribution of Loch Leven Trout.

Edwin T. Huffman	Sept. 3	Merced River, south fork	10,000
Yosemite Valley R. R. Co.	Sept. 30	Merced River, from Busburg to El Portal	53,000
C. B. Hollingsworth	Sept. 30	Cascade Creek	4,000
		Total	70,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Yosemite Valley R. R. Co.	Sept. 30	Merced River, from Busburg to El Portal	60,000

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Yosemite Valley R. R. Co.	Sept. 30	Merced River, from Busburg to El Portal	40,000

MENDOCINO COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
California Western R. R. and Navigation Co.	June 4	Noyo River	320,000
California Western R. R. and Navigation Co.	June 4	Pudding Creek	44,000
P. H. Anderson	June 4	Albion River	20,000
California Western R. R. and Navigation Co.	Aug. 7	Noyo River	184,000
		Total	568,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
California Western R. R. and Navigation Co.	June 4	Hare Creek	12,000

MODOC COUNTY.

Distribution of Blue Catfish.

Applicant	Date	Water stocked	Number
J. T. Spaulding	July 21	Hackmore Reservoir	46

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Irvin Kistler	July 21	Barber Creek	2,000
Irvin Kistler	July 21	Emerson Creek	2,000
T. S. Kemple	July 21	Shields Creek	2,000
Stanley A. McIntosh	July 23	Pine Creek	6,000
		Total	12,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Grover Wimer	July 21	Mill Creek	6,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Grover Wimer	July 21	Mill Creek	6,000
Irvin Kistler	July 21	Eagle Creek	2,000
Irvin Kistler	July 21	Rader Creek	2,000
T. S. Kemple	July 21	Shields Creek	4,000
Stanley A. McIntosh	July 23	Pine Creek	6,000
		Total	20,000

MONO COUNTY.

Distribution of Loch Leven Trout.

W. M. Maule	Aug. 17	West Walker River	4,000
W. M. Maule	Aug. 17	East Fork West Walker River	2,000
W. M. Maule	Aug. 17	Little Twin L's West Walker Watershed	4,000
W. M. Maule	Aug. 17	Horseshoe L's east of Leavitt Meadow	4,000
W. M. Maule	Aug. 17	Lake at head of Silver Creek	2,000
W. M. Maule	Aug. 17	Junction Reservoir	2,000
W. M. Maule	Aug. 17	Molybdenite Lake	2,000
		Total	20,000

Distribution of Eastern Brook Trout.

W. M. Maule	Aug. 17	Headwaters of West Walker River	4,000
W. M. Maule	Aug. 17	Lost Canyon and Mill Creek	4,000
W. M. Maule	Aug. 17	Molybdenite Creek	2,000
W. M. Maule	Aug. 17	Sawyer Creek	2,000
W. M. Maule	Aug. 17	Willow Flats, Molybdenite Watershed	2,000
		Total	14,000

MONTEREY COUNTY.

Distribution of Steelhead Trout.

W. M. Casey	Aug. 4	Nacimiento River	42,500
W. M. Casey	Aug. 4	Arroyo Seco	20,000
W. M. Casey	Aug. 4	San Antonio	62,500
		Total	125,000

Distribution of Loch Leven Trout.

S. E. Whitcher	July 8	Los Vaquero	9,000
S. E. Whitcher	July 8	Horse Canyon	3,500
Jno. L. D. Roberts	July 7	Carmel River	22,500
Jno. L. D. Roberts	Aug. 5	Carmel River at Miller Canyon	22,500
		Total	57,500

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Paul Tabbott	July 8	Arroyo Seco	15,000
S. E. Whitcher	July 8	Horse Canyon	6,000
S. E. Whitcher	July 8	Piney Creek	12,000
S. E. Whitcher	July 7	Arroyo Seco	6,500
Chas. H. Culp	July 7	White Rock Creek	9,000
W. M. Casey	Aug. 4	Nacimiento River	7,500
W. M. Casey	Aug. 4	Arroyo Seco	5,000
W. M. Casey	Aug. 4	San Antonio	12,500
		Total	73,500

NAPA COUNTY.

Distribution of Rainbow Trout.

Theo. A. Bell	Sept. 27	Bells Creek	21,000

Distribution of Steelhead Trout.

Clifford N. Clark	May 30	Trout Creek	21,000
Clifford N. Clark	May 30	Copelle Creek	21,000
Geo. H. Warford	May 30	Lake Madigan	75,000
Geo. H. Warford	May 30	Lake Frey	45,000
C. H. Drake	May 30	Ritchie Creek	36,000
Henry Feige	May 30	Feige Creek	12,000
F. W. Mielem	May 30	Upper Conn Creek	24,000
J. P. Orr	May 30	Soscol Creek	18,000
William West	May 30	Napa Creek	60,000
Bismark Bruck	Sept. 27	Lyman Creek	2,000
Bismark Bruck	Sept. 27	Conn Creek	2,000
Warren C. Steves	Sept. 27	Conn Creek	4,000
Warren C. Steves	Sept. 27	Chiles Creek	6,000
Warren C. Steves	Sept. 27	York Creek	6,000
Warren C. Steves	Sept. 27	Sage Creek	4,000
		Total	336,000

NEVADA COUNTY.

Distribution of Steelhead Trout.

W. B. Tubbs	Sept. 15	Webber Lake	8,000
Truckee Chamber of Com.	Oct. 2	Donner Lake	200,000
		Total	208,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
J. F. Swears	July 1	Yuba River	6,000
J. F. Swears	July 1	Lake Van Norden	6,000
Mrs. Geo. W. Kenny	July 1	Lake Independence	9,000
E. F. Steward	July 1	Lake Flora	6,000
E. F. Steward	July 1	Willow Lake	6,000
S. F. Fly Casting Club	July 1	Union Mill's Pond	39,000
Pacific Gas and Electric Co.	Sept. 4	Lake Spaulding tributaries, Fordyce Creek	15,000
Pacific Gas and Electric Co.	Sept. 4	South Yuba River	15,000
Pacific Gas and Electric Co.	Sept. 4	Bloody Run	16,000
		Total	118,000

Distribution of Eastern Brook Trout.

Stewart McKay	July 1	Rionarson Creek	12,000
J. F. Swears	July 1	Yuba River	5,000
J. F. Swears	July 1	Lake Van Norton	4,000
Mrs. Geo. W. Kenny	July 1	Lake Independence	9,000
W. B. Tubbs	Sept. 15	Webber Lake	2,000
W. B. Tubbs	Sept. 15	Lake of the Woods	3,000
The Boca Mill Co.	Sept. 15	Juniper Creek	10,000
Grass Valley Sportsman	Sept. 23	Green Horn	6,000
Grass Valley Sportsman	Sept. 23	South Yuba River	14,000
Grass Valley Sportsman	Sept. 23	Rattle Snake	2,000
Grass Valley Sportsman	Sept. 23	Wolf Creek	4,000
Grass Valley Sportsman	Sept. 23	Bear River Canal	4,000
		Total	75,000

Distribution of Rainbow Trout.

Mrs. Geo. W. Kenny	July 1	Lake Independence	12,000
S. F. Fly Casting Club	Aug. 15	Union Mill's Pond	60,000
Ever Bros.	Aug. 15	Ever Creek	16,000
Sierra Nevada W. & L. Co.	Aug. 15	Prosser Creek	21,000
Sierra Nevada W. & L. Co.	Aug. 15	Sage Hen Creek	9,000
M. L. West	Aug. 15	South Yuba River	8,000
Pacific Gas and Electric Co.	Sept. 4	Lake Spaulding tributaries, Fordyce Creek	15,000
Pacific Gas and Electric Co.	Sept. 4	South Yuba River	15,000
Pacific Gas and Electric Co.	Sept. 4	Bloody Run	12,000
The Boca Mill Co.	Sept. 4	Little Truckee	30,000
Nevada City Sportsman Club	Sept. 21	Deer Creek	36,000
Nevada City Sportsman Club	Sept. 21	Rock Creek	14,000
Grass Valley Sportsman Club	Sept. 23	Bouman Lake	20,000
Grass Valley Sportsman Club	Sept. 23	Fancherie Lake	8,000
Grass Valley Sportsman Club	Sept. 23	Saw Mill Lake	8,000
Grass Valley Sportsman Club	Sept. 23	Bear River	20,000
Grass Valley Sportsman Club	Sept. 23	Green Horn	8,000
Grass Valley Sportsman Club	Sept. 23	South Yuba River	14,000
Grass Valley Sportsman Club	Sept. 23	Rattle Snake	2,000
		Total	328,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

ORANGE COUNTY.

Distribution of Catfish.

Applicant	Date	Water stocked	Number
A. J. McFadden	Oct. 13	Laguna Lake	27

Distribution of Sunfish.

H. M. Tracy	Oct. 13	School Pond and aquarium	15

Distribution of Steelhead Trout.

W. F. Adkinson	Oct. 13	Trabuso	6,000
A. F. Forester	Oct. 13	San Juan Creek	6,000
A. F. Forester	Oct. 13	Trabuso	6,000
		Total	18,000

Distribution of Rainbow Trout.

W. F. Adkinson	Oct. 13	Trabuso	4,000

PLACER COUNTY.

Distribution of Rainbow Trout.

Frank L. Harmon	July 1	Canyon Creek	15,000
A. G. McFarland	July 1	South Yuba River	6,000
Lake Tahoe R. & T. Co.	Aug. 16	Ward Creek	12,000
Miss Katherine Chandler	Aug. 16	Bear Creek	6,000
C. Frederick Kohl	Aug. 16	Blackwood Creek	4,000
H. M. Freeman	Aug. 16	South Yuba River	14,000
Placer F. and H. P. Assn.	Sept. 4	Clipper Ravine	4,000
Placer F. and H. P. Assn.	Sept. 4	Wessley Creek	2,000
North Fork G. Pro. Assn.	Sept. 4	Dutch Ravine	2,000
North Fork G. Pro. Assn.	Sept. 4	Secret Ravine	1,000
North Fork G. Pro. Assn.	Sept. 4	Cook and Boggs Ravine	1,000
North Fork G. Pro. Assn.	Sept. 4	American River, north of North Fork	10,000
North Fork Assn.	Sept. 15	American River, North Fork	15,000
Lawrence & Comstock	Sept. 16	Brockway Creek	6,000
William Taft	Sept. 16	Rock Creek	4,000
Lake Tahoe R. & T. Co.	Sept. 16	Burton Creek	12,000
Fish and Game Com.	Sept. 21	Truckee River	10,000
E. A. Garrison	Oct. 24	Volcano Creek	8,000
E. A. Garrison	Oct. 24	Shirttail Creek	10,000
E. A. Garrison	Oct. 24	El Dorado Creek	8,000
E. A. Garrison	Oct. 24	Big Secret Creek	8,000
E. A. Garrison	Oct. 24	Screw Augur Creek	8,000
E. A. Garrison	Oct. 24	Devils Canyon	8,000
		Total	174,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
W. A. Buckman	July 1	Cold Stream	15,000
H. M. Freeman	July 1	South Yuba River	12,000
J. B. Knapp	July 1	Blue Canyon Creek	8,000
J. B. Knapp	July 1	North Fork of American River	6,000
E. F. Stewart	July 1	Castle Creek	9,000
Lake Tahoe R. & T. Co.	Aug. 16	Ward Creek	12,000
F. H. Scott	Aug. 16	Squaw Creek	20,000
Miss Katherine Chandler	Aug. 16	Five Lakes	4,000
W. J. McCleary	Aug. 15	Brushy Canyon	9,000
W. J. McCleary	Aug. 15	Shirttail Canyon	9,000
W. J. McCleary	Aug. 15	North Fork of American River	2,000
C. Frederick Kohl	Aug. 16	Blackwood Creek	8,000
E. L. Mooney	Sept. 4	South Yuba River	2,000
Pacific Gas and Elec. Co.	Sept. 4	Lake Valley	14,000
North Fork Assn.	Sept. 15	American River, North Fork	4,000
Tahoe Vista I. Co.	Sept. 16	Griff Creek	4,000
Lawrence & Comstock	Sept. 16	Brockway Creek	4,000
Lake Tahoe R. & T. Co.	Sept. 16	Burton Creek	8,000
		Total	155,000

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
H. M. Freeman	July 1	Loch Leven Lake	15,000
A. G. McFarland	July 1	South Yuba River	6,000
Lake Tahoe R. & T. Co.	Aug. 16	Ward Creek	12,000
Miss Katherine Chandler	Aug. 16	Five Lakes	6,000
Placer F. and H. Pr. Assn.	Sept. 4	Clipper Ravine	2,000
Placer F. and H. Pr. Assn.	Sept. 4	Wessley Creek	2,000
Placer F. and H. Pr. Assn.	Sept. 2	Codfish Creek	2,000
E. L. Mooney	Sept. 2	South Yuba River	4,000
North Fork G. Pro. Assn.	Sept. 2	Dutch Ravine	2,000
North Fork G. Pro. Assn.	Sept. 2	Secret Ravine	1,000
North Fork G. Pro. Assn.	Sept. 2	Cook and Boggs Ravine	1,000
North Fork G. Pro. Assn.	Sept. 2	American River	10,000
Pacific Gas and Elec. Co.	Sept. 2	Lake Valley	14,000
North Fork Assn.	Sept. 15	American River, North Fork	8,000
Tahoe Vista I. Co.	Sept. 16	Griff Creek	4,000
Lawrence & Comstock	Sept. 16	Brockway Creek	4,000
Fish and Game Com.	Sept. 21	Truckee River	6,000
		Total	99,000

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
H. A. Snelling	Oct. 24	Antelope Ravine	8,000
F. R. Payne and R. Fowler	Oct. 24	Canyon Creek	8,000
		Total	16,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

PLUMAS COUNTY.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Grizzly Ice Co.	June 13	Grizzly Ice Lake	12,000
Portola Chamber of Com.	June 13	Grizzly Creek	18,000
C. N. Johnson and J. B. Sutton	June 13	Smith Creek	9,000
C. N. Johnson and J. B. Sutton	June 13	Gray Eagle Creek	9,000
Charles Belden	June 13	Chipps Creek	6,000
Charles Belden	June 13	Indian Creek	3,000
N. P. Nelson	June 13	Yellow Creek	6,000
A. L. Andrews	June 13	Feather River	42,000
Leo M. Nevis	June 13	Feather River	12,000
I. C. Zant	June 13	Feather River	39,000
Roger T. Remick	June 15	Bonta Creek	20,000
Robert Canonica	July 15	Last Chance Creek	2,500
Portola Chamber of Com.	July 21	Grizzly Creek	5,000
Mrs. M. P. Rogers	July 21	Milk Ranch Creek	12,500
		Total	196,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Grizzly Ice Co.	June 13	Grizzly Creek	9,000
Portola Chamber of Com.	June 13	Grizzly Creek	18,000
Johnsville Boat Club	June 13	Eureka Lake	12,000
Johnsville Boat Club	June 13	Jamison Lake	12,000
Charles Belden	June 13	Indian Creek	3,000
Charles Belden	June 13	Yellow Creek	6,000
N. P. Nelson	June 13	Indian Creek	3,000
N. P. Nelson	June 13	Chipps Creek	3,000
Leo M. Nevis	June 13	Chambers Creek	6,000
H. G. Porter	July 15	Mill Creek	14,400
H. G. Porter	July 15	Little Spanish Creek	6,600
W. G. Hottman	July 15	Clear Creek	4,000
Portola Chamber of Com.	July 21	Grizzly Creek	5,000
W. H. Day	July 21	Jackass Creek	5,000
W. H. Day	July 21	Chambers Creek	5,000
B. D. Maynard	July 21	Rock Creek	15,000
		Total	127,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Johnson & Sutton	July 14	Gray Eagle	6,000
A. T. Walker	July 14	East Branch Chipps River	4,000
A. T. Walker	July 14	Yellow Creek	4,000
A. T. Walker	July 14	Chambers Creek	4,000
Geo. A. Sanborn	July 15	Feather River, south fork	12,000
Roger T. Remick	July 15	Bonta Creek	12,000
Portola Chamber of Com.	July 15	Grizzly Creek	18,000
Leo M. Nevis	July 15	Jackass Creek	10,500
Leo M. Nevis	July 15	Feather River	1,500
N. P. Nelson	July 15	Chipps Creek	3,000
N. P. Nelson	July 15	Yellow Creek	3,000
W. G. Hottman	July 15	Mill Creek	9,000
Chas. Belden	July 15	Chipps Creek	6,000
Chas. Belden	July 15	Yellow Creek	3,000
Dr. J. A. Barr	July 15	Lost Creek	48,000
Oro Electric Corp.	July 15	Yellow Creek	15,000
Robert Canonica	July 15	Last Chance Creek	9,000
I. C. Zent	July 21	Feather River	30,000
Portola Chamber of Com.	July 21	Grizzly Creek	15,000
A. J. Stanley	July 21	Chambers Creek	9,000
A. J. Stanley	July 21	Milk Ranch Creek	9,000
Johnson & Sutton	July 21	Smith Creek	6,000
W. H. Day	July 21	Feather River	3,000
A. L. Andrews	July 21	Feather River	24,000
A. L. Andrews	July 21	Jackass Creek	6,000
		Total	270,000

Distribution of Steelhead Trout.

W. G. Hottman	July 21	Kellogg Creek	4,000
W. G. Hottman	July 21	Mill Creek	8,000
		Total	12,000

RIVERSIDE COUNTY.

Distribution of Loch Leven Trout.

H. I. Ruess	Oct. 13	Dark Canyon	6,000
H. I. Ruess	Oct. 13	Fuller Creek	2,000
		Total	8,000

Distribution of Rainbow Trout.

F. S. Johnson	Oct. 6	Coldwater Creek	4,000
H. I. Ruess	Oct. 13	Dark Canyon	2,000
H. I. Ruess	Oct. 13	Fuller Creek	2,000
		Total	8,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SACRAMENTO COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
R. Warren	Aug. 21	Upper Mokelumne River	7,500
Geo. Neale	Sept. 3	South Side Park	6,000
		Total	13,500

SAN BENITO COUNTY.

Distribution of Steelhead Trout.

Fred W. Boyns	July 8	Los Viboras Creek	18,000

Distribution of Eastern Brook Trout.

E. A. Pearce	July 7	San Juan Canyon Creek	5,000

Distribution of Rainbow Trout.

E. A. Pearce	July 7	San Juan Canyon Creek	12,000

SAN BERNARDINO COUNTY.

Distribution of Black Bass.

S. Guasti	Oct. 13	Guasti Reservoir	45

Distribution of Loch Leven Trout.

W. C. Malone	Oct. 6	Devil Canyon	4,000
W. C. Malone	Oct. 6	Forest Home Stream	4,000
F. Culver	Oct. 6	Fish Creek	6,000
L. M. King	Oct. 6	Mountain Home Stream, east fork	2,000
L. M. King	Oct. 6	Forscee Creek	2,000
L. M. King	Oct. 6	Upper Santa Ana	4,000
		Total	22,000

Distribution of Eastern Brook Trout.

F. Culver	Oct. 6	Falls Creek, north fork	2,000
F. Culver	Oct. 6	Falls Creek, east fork	2,000
F. Culver	Oct. 6	South tributary Mill Creek	4,000
		Total	8,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
W. C. Malone	Oct. 6	Lytle Creek	16,000
W. C. Malone	Oct. 6	Waterman Canyon	4,000
F. Culver	Oct. 6	Mill Creek, upper	4,000
F. Culver	Oct. 6	Alder Creek	2,000
Mark Krysto	Oct. 6	Cucamonga Canyon	4,000
L. M. King	Oct. 6	Barton Creek	4,000
L. M. King	Oct. 6	South Fork	2,000
L. M. King	Oct. 6	Upper Santa Ana	6,000
		Total	42,000

SAN DIEGO COUNTY.

Distribution of Rainbow Trout.

Webb Toms	Oct. 13	Pine Creek	4,000
Webb Toms	Oct. 13	Boulder Creek	2,000
Webb Toms	Oct. 13	Cuyamaca Lake	2,000
S. C. Dickson	Oct. 13	Pauma Creek	10,000
S. C. Dickson	Oct. 13	Lion Creek	2,000
Ed Fletcher	Oct. 13	Cauda Verde Creek	2,000
Ed Fletcher	Oct. 13	Mataqual Creek	2,000
Ed Fletcher	Oct. 13	Dehr Creek	2,000
Ed Fletcher	Oct. 13	Cedar Creek	2,000
DeWitt C. Mitchell	Oct. 13	Cedar Creek	8,000
		Total	36,000

Distribution of Eastern Brook Trout.

S. C. Dickson	Oct. 13	Pauma Creek	2,000
S. C. Dickson	Oct. 13	Lion Creek	2,000
Ed Fletcher	Oct. 13	Cauda Verde Creek	2,000
Ed Fletcher	Oct. 13	Mataqual Creek	2,000
		Total	8,000

Distribution of Loch Leven Trout.

S. C. Dickson	Oct. 13	Pauma Creek	4,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SAN LUIS OBISPO COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Dr. C. S. Noble	June 26	Lopez Creek	20,000
Dr. C. S. Noble	June 26	Arroyo Grande Creek	30,000
Dr. C. S. Noble	June 26	Tar Spring Creek	10,000
San Luis G. and R. Club	June 26	See Canyon Creek	15,000
San Luis G. and R. Club	June 26	Coon Creek	12,000
San Luis G. and R. Club	June 26	Islay Creek	15,000
San Luis G. and R. Club	June 26	Copper Mine Creek	3,000
San Luis G. and R. Club	June 26	San Luis Creek	30,000
San Luis G. and R. Club	June 26	Corral de Pedro	13,000
San Luis G. and R. Club	June 26	Steiner Creek	12,000
San Luis G. and R. Club	June 26	Upper Choro	12,000
San Luis G. and R. Club	June 26	Lower Choro	12,000
San Luis G. and R. Club	June 26	Morro	12,000
San Luis G. and R. Club	June 26	Torro	12,000
San Luis G. and R. Club	June 26	Old Creek	6,000
San Luis G. and R. Club	June 26	Clark Valley Creek	6,000
Santa Maria R. and G. Club	June 26	Twin Lake	10,000
Santa Maria R. and G. Club	June 26	Celery Lake	20,000
Santa Maria R. and G. Club	June 26	Pipe Line Lake	10,000
H. J. Abels	July 3	Alamo	6,000
		Total	266,000

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
Colony Holding Corp.	June 26	Santa Margarita	9,000
Colony Holding Corp.	June 26	Graves Creek	3,000
Santa Maria R. and G. Club	June 26	Mud Lake	8,000
Santa Maria R. and G. Club	June 26	White Lake	7,000
		Total	27,000

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Colony Holding Corp.	June 26	Atascadero Creek	9,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
P. H. Murphy	June 26	Atascadero Creek	7,500
P. H. Murphy	June 26	San Simeon Creek	10,000
P. H. Murphy	June 26	Berros Creek	3,500
Dr. C. S. Noble	June 26	Lopez Creek	3,000
Dr. C. S. Noble	June 26	Arroyo Grande Creek	3,000
Dr. C. S. Noble	June 26	Tar Spring Creek	3,000
San Luis G. and R. Club	June 26	Islay Creek	3,000
San Luis G. and R. Club	June 26	Copper Mine Creek	3,000
San Luis G. and R. Club	June 26	San Luis Creek	15,000
San Luis G. and R. Club	June 26	Corral de Pedro	3,000
San Luis G. and R. Club	June 26	Steiner Creek	3,000
San Luis G. and R. Club	June 26	Upper Choro	3,000
San Luis G. and R. Club	June 26	Lower Choro	3,000
San Luis G. and R. Club	June 26	Morro	3,000
San Luis G. and R. Club	June 26	Torro	3,000
		Total	69,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SAN MATEO COUNTY.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Ocean Shore R. R. Co.	June 20	Purisima Creek	60,000
Ocean Shore R. R. Co.	June 20	Corte Madera Creek	20,000
		Total	80,000

Distribution of Steelhead Trout.

Ocean Shore R. R. Co.	June 20	Tobin Creek	32,000
Ocean Shore R. R. Co.	June 20	Higgin Creek	44,000
Ocean Shore R. R. Co.	June 20	Lobitos Creek	60,000
Ocean Shore R. R. Co.	June 20	Tunitas Creek	40,000
Ocean Shore R. R. Co.	June 20	Harrington Creek	60,000
Ocean Shore R. R. Co.	June 20	San Gregoria Creek	84,000
Jos. B. Fleming	June 20	San Pedro Creek	40,000
Butana L. and Dev. Co.	Sept. 8	Butano Creek	10,000
McCormick & Son	Sept. 8	Butano Creek	10,000
Herbert E. Law	Oct. 6	Corte Madera Creek	20,000
		Total	400,000

SANTA BARBARA COUNTY.

Distribution of Quinnat Salmon.

H. J. Abels	July 8	Santa Ynez River	25,000

Distribution of Steelhead Trout.

H. J. Abels	July 8	Salsipuedes Creek	6,000
H. J. Abels	July 8	Miguelito	6,000
H. J. Abels	July 8	Santa Ynez River	30,000
H. J. Abels	July 8	Tepusquet	6,000
H. J. Abels	July 8	Guadalupe Creek	6,000
H. J. Abels	July 8	Dos Pueblos	21,000
H. J. Abels	July 8	Santa Ynez River	60,000
H. S. Deaderick	Oct. 7	Arroyo Padaro	3,000
H. S. Deaderick	Oct. 7	Rincon Creek	3,000
H. S. Deaderick	Oct. 7	Carpinteria Creek	3,000
H. S. Deaderick	Oct. 7	Gobenerdor Creek	3,000
		Total	147,000

Distribution of Loch Leven Trout.

H. J. Abels	July 8	Sisquoc	7,500
H. J. Abels	July 8	Manzana	2,500
H. J. Abels	July 8	Tepusquet	2,500
		Total	12,500

Distribution of Eastern Brook Trout.

H. J. Abels	July 8	Sisquoc	10,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SANTA CLARA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Earle Downing	June 9	Calaveras Creek	10,000
Earle Downing	June 9	Bear Creek	8,000
Earle Downing	June 9	Valpe Creek	8,000
C. H. Squire	Aug. 8	Los Gatos	15,000
		Total	41,000

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
I. L. Koppel	July 7	Smiths Creek	30,000

SHASTA COUNTY.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
C. L. Watson	July 8	Clear Creek	10,000
C. L. Watson	July 8	Five Mile Gulch	2,500
C. L. Watson	July 8	Mill Creek	2,500
Hazel Gold Mining Co.	July 8	Crystal Creek	7,500
Hazel Gold Mining Co.	July 8	Kliens Gulch	2,500
W. H. Logan	July 8	Eagle Creek	5,000
W. H. Logan	July 8	East Fork of Cottonwood	7,500
W. H. Logan	July 8	South Fork of Cottonwood	5,000
Alex Hansen	Aug. 22	Cedar Creek	2,500
Alex Hansen	Aug. 22	Cow Creek	2,500
Alex Hansen	Aug. 22	Willow Creek	2,500
Alex Hansen	Aug. 22	Montgomery Creek	2,500
H. O. Wicks	Aug. 25	Sacramento River	8,000
Harmon Bell	Aug. 26	Sacramento River	10,000
Dunsmuir Promotion Club	Aug. 29	Little Castle Creek	16,000
Dunsmuir Promotion Club	Aug. 29	Soda Creek	39,000
Dunsmuir Promotion Club	Aug. 29	Little Soda Creek	5,000
Seymour S. Bass	Aug. 29	McCloud River	40,000
Sacramento Valley Eastern R. R.	Aug. 29	Dedalles Creek	10,000
J. L. Barham	Sept. 8	Rock Creek	4,000
		Total	184,500

Distribution of Bass.

Applicant	Date	Water stocked	Number
E. W. Ehmann	Nov. 1	Harbison Reservoir	40

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
H. O. Wicks	Aug. 25	Sacramento River	8,000
Harmon Bell	Aug. 26	Sacramento River	12,000
J. L. Barham	Sept. 8	Rock Creek	8,000
Dunsmuir Promotion Club	Oct. 17	Little Castle Creek	100,000
Dunsmuir Promotion Club	Oct. 17	Sacramento River	150,000
		Total	278,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Loch Leven Trout.

Applicant	Date	Water stocked	Number
C. L. Watson	July 8	Clear Creek	10,000
C. L. Watson	July 8	Five Mile Gulch	2,500
C. L. Watson	July 8	Mill Creek	2,500
Hazel Gold Mining Co.	July 8	Crystal Creek	2,500
Hazel Gold Mining Co.	July 8	Kilens Gulch	2,500
Dunsmuir Promotion Club	Aug. 29	Little Castle Creek	16,000
Dunsmuir Promotion Club	Aug. 29	Soda Creek	39,000
Dunsmuir Promotion Club	Aug. 29	Little Soda Creek	5,000
Sacramento Valley Eastern R. R.	Aug. 29	Dedalles Creek	10,000
		Total	90,000

SIERRA COUNTY.

Distribution of Steelhead Trout.

Webber Lake Club	Sept. 21	Webber Lake	16,000
Webber Lake Club	Sept. 21	Lake of the Woods	6,000
		Total	22,000

Distribution of Loch Leven Trout.

R. W. Thorne	July 15	Loyalton Creek	5,000
R. W. Thorne	July 15	Turner Creek	5,000
R. W. Thorne	July 15	Bodinach Creek	5,000
G. F. Edwards	July 21	Gold Lake	10,000
A. S. Nichols	Sept. 15	Cool Creek	6,000
A. S. Nichols	Sept. 15	Morgan Creek	2,000
A. S. Nichols	Sept. 15	Miller Creek	2,000
		Total	35,000

Distribution of Eastern Brook Trout.

W. B. Tubbs	July 1	Inlet to Webber Lake	18,000
G. F. Edwards	July 21	Gold Lake	5,000
		Total	23,000

Distribution of Rainbow Trout.

W. B. Tubbs	July 1	Inlet to Webber Lake	18,000
R. W. Thorne	July 15	Loyalton Creek	7,000
R. W. Thorne	July 15	Turner Creek	7,000
R. W. Thorne	July 15	Bodinach Creek	7,000
A. S. Nichols	Sept. 15	Cool Creek	2,000
A. S. Nichols	Sept. 15	Morgan Creek	2,000
A. S. Nichols	Sept. 15	Miller Creek	2,000
		Total	45,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SISKIYOU COUNTY.

Distribution of Quinnat Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	Jan. 23	Cold Creek, tributary to Sacramento River	597,000
Fish and Game Com.	Jan. 25	Cold Creek, tributary to Sacramento River	692,000
Fish and Game Com.	Jan. 26	Sullaway Creek, tributary to Sacramento River	603,000
Fish and Game Com.	Jan. 27	Schoolhouse Creek, tributary to Sac. River	645,000
Fish and Game Com.	Jan. 28	Sullaway Creek, tributary to Sacramento River	347,000
Fish and Game Com.	Jan. 29	Spring Creek, tributary to Sacramento River	435,000
Fish and Game Com.	Jan. 30	Cold Creek, tributary to Sacramento River	181,000
Fish and Game Com.	Jan. 31	Sullaway Creek, tributary to Sacramento River	428,000
Fish and Game Com.	Feb. 5	Spring Creek, tributary to Sacramento River	655,000
Fish and Game Com.	Feb. 13	Schoolhouse Creek, tributary to Sac. River	400,000
Fish and Game Com.	Feb. 15	Schoolhouse Creek, tributary to Sac. River	650,000
Fish and Game Com.	Feb. 17	Spring Creek, tributary to Sacramento River	400,000
Fish and Game Com.	Feb. 18	Sullaway Creek, tributary to Sacramento River	550,000
Fish and Game Com.	Feb. 22	Sullaway Creek, tributary to Sacramento River	756,000
Fish and Game Com.	Feb. 23	Spring Creek, tributary to Sacramento River	300,000
Fish and Game Com.	Feb. 26	Sullaway Creek, tributary to Sacramento River	634,000
Fish and Game Com.	Feb. 27	Schoolhouse Creek, tributary to Sac. River	500,000
Fish and Game Com.	Mar. 1	Schoolhouse Creek, tributary to Sac. River	776,000
Fish and Game Com.	Mar. 2	Spring Creek, tributary to Sacramento River	600,000
Fish and Game Com.	Mar. 3	Cold Creek, tributary to Sacramento River	653,000
Fish and Game Com.	Mar. 5	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	Mar. 8	Cold Creek, tributary to Sacramento River	636,000
Fish and Game Com.	Mar. 10	Spring Creek, tributary to Sacramento River	600,000
Fish and Game Com.	Mar. 11	Cold Creek, tributary to Sacramento River	600,000
Fish and Game Com.	Mar. 13	Schoolhouse Creek, tributary to Sac. River	605,000
Fish and Game Com.	Mar. 16	Sullaway Creek, tributary to Sacramento River	500,000
Fish and Game Com.	Mar. 17	Sullaway Creek, tributary to Sacramento River	500,000
Fish and Game Com.	Mar. 18	Sullaway Creek, tributary to Sacramento River	389,000
Fish and Game Com.	Mar. 30	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	Mar. 31	Cold Creek, tributary to Sacramento River	602,000
Fish and Game Com.	April 5	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 6	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 7	Spring Creek, tributary to Sacramento River	507,000
Fish and Game Com.	April 11	Sullaway Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 12	Sullaway Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 14	Cold Creek, tributary to Sacramento River	506,000
Fish and Game Com.	April 15	Sullaway Creek, tributary to Sacramento River	400,000
Fish and Game Com.	April 17	Sullaway Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 18	Sullaway Creek, tributary to Sacramento River	477,000
Fish and Game Com.	April 20	Spring Creek, tributary to Sacramento River	309,000
Fish and Game Com.	April 22	Sullaway Creek, tributary to Sacramento River	654,000
Fish and Game Com.	April 25	Cold Creek, tributary to Sacramento River	600,000
Fish and Game Com.	April 26	Cold Creek, tributary to Sacramento River	353,000
Fish and Game Com.	April 27	Cold Creek, tributary to Sacramento River	300,000
Fish and Game Com.	April 28	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	April 29	Sullaway Creek, tributary to Sacramento River	555,000
Fish and Game Com.	April 30	Cold Creek, tributary to Sacramento River	500,000
Fish and Game Com.	May 2	Klamath River	450,000
Fish and Game Com.	May 4	Klamath River	200,000
Fish and Game Com.	Oct. 8	Cold Creek, tributary to Sacramento River	50,000
Fish and Game Com.	Oct. 18	Klamath River	200,000
Fish and Game Com.	Nov. 2	Sullaway Creek, tributary to Sacramento River	2,000,000
Fish and Game Com.	Nov. 2	Cold Creek, tributary to Sacramento River	2,970,000
Fish and Game Com.	Nov. 18	Klamath River	15,000
Fish and Game Com.	Nov. 19	Klamath River	15,000
		Total	30,295,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Silver Salmon.

Applicant	Date	Water stocked	Number
Fish and Game Com.	May 2	Klamath River	200,000
Fish and Game Com.	May 4	Klamath River	400,000
Fish and Game Com.	May 5	*Cold Creek, tributary to Sacramento River	746,000
		Total	1,346,000

*Silver Salmon planted in Cold Creek May 5 badly diseased; not considered worth hauling back to Klamath River.

Distribution of Black Spotted Trout.

Zick Abrams	Sept. 9	Abrams Lake	20,000

Distribution of Steelhead Trout.

R. P. Wilson	July 16	Deer Creek	6,000
Fish and Game Com.	July 18	Klamath River	350,000
McCloud River Lmbr. Co.	Aug. 9	McCloud River	27,500
McCloud River R. R. Co.	Aug. 9	McCloud River, east of Dry Creek	35,000
McCloud River R. R. Co.	Aug. 11	McCloud River, east of Dry Creek	37,500
McCloud River Lmbr. Co.	Aug. 11	McCloud River	25,000
Sisson Promotion Assn.	Aug. 12	Wagon Creek	30,000
Sisson Promotion Assn.	Aug. 12	Schoolhouse Creek	30,000
Sisson Promotion Assn.	Aug. 12	Spring Creek	50,000
Sisson Promotion Assn.	Aug. 12	Cold Creek	30,000
Sisson Promotion Assn.	Aug. 12	Sullaway Creek	60,000
Montague Gun Club	Aug. 25	Little Shasta Creek	16,000
Yreka Chamber of Com.	Aug. 25	Shasta River	20,000
F. O. Branstetter	Sept. 7	Sacramento River	10,000
		Total	727,000

Distribution of Loch Leven Trout.

B. Casalta	July 2	Wagon Creek	8,000
Sisson Promotion Club	July 2	Wagon Creek	10,000
Sisson Promotion Club	July 2	Spring Creek	15,000
Sisson Promotion Club	July 2	Sullaway Creek at Rupps	25,000
Robert Rupp	July 12	Sullaway Creek	15,000
McCloud River Lmbr. Co.	Aug. 9	McCloud River	22,000
McCloud River R. R. Co.	Aug. 9	McCloud River	22,000
W. L. Falkner	Aug. 25	Shasta River, headwaters	12,000
W. M. Bray	Aug. 25	Antelope Creek	5,000
O. E. Pile	Aug. 25	Butte Creek	5,000
Montague Gun Club	Aug. 25	Little Shasta Creek	4,000
Yreka Chamber of Com.	Aug. 25	Shasta River	16,000
Zick Abrams	Sept. 9	Abrams Lake	15,000
Dunsmuir Promotion Club	Aug. 29	Bear Creek	6,500
Dunsmuir Promotion Club	Aug. 29	Hedge Creek	4,500
Dunsmuir Promotion Club	Aug. 29	Soda Creek, Upper Branch	9,000
C. L. Lewis	Oct. 1	Cold Creek	35,000
Zick Abrams	Oct. 27	Abrams Lake	15,000
Sisson Promotion Club	Oct. 29	Cold Creek	5,000
		Total	249,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
B. Casalta	July 2	Wagon Creek	8,000
Sisson Promotion Club	July 2	Wagon Creek	6,000
Sisson Promotion Club	July 2	Spring Creek	4,000
Robert Rupp	July 12	Spring Creek	25,000
C. Lewis	July 15	Cold Creek	30,000
McCloud River R. R. Co.	Aug. 9	McCloud River, east of Dry Creek	14,000
McCloud River Lmbr. Co.	Aug. 9	McCloud River, east of Dry Creek	16,000
C. S. Erickson	Sept. 1	Bear Creek	6,000
		Total	109,000

Distribution of Rainbow Trout.

Sisson Promotion Club	July 2	Sullaway Creek	25,000
Sisson Promotion Club	July 2	Sullaway Creek at Rupps	35,000
R. P. Wilson	July 16	Deer Creek	20,000
McCloud River Lmbr. Co.	Aug. 9	McCloud River	24,000
McCloud River. R. R. Co.	Aug. 9	McCloud River, east of Dry Creek	26,000
McCloud River R. R. Co.	Aug. 11	McCloud River, east of Dry Creek	24,000
McCloud River Lmbr. Co.	Aug. 11	McCloud River	26,000
Mrs. R. C. Ney	Aug. 21	Little Shasta Creek	8,000
J. A. Carton	Aug. 25	Shasta River	12,000
W. M. Bray	Aug. 25	Antelope Creek	18,000
O. E. Pile	Aug. 25	Butte Creek	9,000
Montague Gun Club	Aug. 25	Little Shasta Creek	10,000
C. S. Erickson	Sept. 1	Bear Creek	6,000
Silas Nicholson	Sept. 1	Bear Creek	8,000
F. O. Branstetter	Sept. 7	Sacramento River	15,000
Zick Abrams	Sept. 9	Abrams Lake	25,000
Dunsmuir Promotion Club	Aug. 29	Bear Creek	6,500
Dunsmuir Promotion Club	Aug. 29	Hedge Creek	6,500
Dunsmuir Promotion Club	Aug. 29	Soda Creek, Upper Branch	7,000
C. Lewis	Oct. 1	Cold Creek	40,000
Zick Abrams	Oct. 27	Abrams Lake	15,000
		Total	366,000

SOLANO COUNTY.

Distribution of Steelhead Trout.

Winters Fish and Game Protective Association	July 21	Miller Creek	45,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SONOMA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
H. S. Gutermute	Aug. 6	Mark West Creek	20,000
W. R. Stearns	Sept. 27	Sonoma Creek	30,000
J. W. Wise	Sept. 27	Adobe Canyon	10,000
J. W. Wise	Sept. 27	Nuns Creek	10,000
J. W. Wise	Sept. 27	Johnson Creek	10,000
F. D. Trosper	Oct. 12	Austin Creek	35,000
F. D. Trosper	Oct. 12	Ward Creek	5,000
F. D. Trosper	Oct. 12	Bear Pen Creek	10,000
A. H. Richardson	Oct. 12	Stewart's Point Creek	20,000
A. H. Richardson	Oct. 12	Fort Ross Creek	5,000
H. C. McCaughey	Oct. 18	Salmon Creek	25,000
		Total	180,000

Distribution of Rainbow Trout.

H. S. Gutermute	Oct. 12	Mark West Creek	6,000

TEHAMA COUNTY.

Distribution of Steelhead Trout.

C. W. De Long	July 8	Mill Creek	9,000
J. A. Owen	July 8	South Fork of Cottonwood Creek	12,000
U. S. Forestry Service	Aug. 21	Battle Creek at Lower Bridge	5,000
U. S. Forestry Service	Aug. 21	Martin Creek at Mineral Co.	5,000
U. S. Forestry Service	Aug. 21	Battle Creek at Upper Bridge	10,000
A. B. McCollum	Aug. 21	Deer Creek	7,500
		Total	48,500

Distribution of Loch Leven Trout.

W. E. Hamlin	July 8	Mill Creek	12,500
Walter Stoll	Aug. 14	Elder Creek	6,000
H. H. Zimmerman	Aug. 28	Mill Creek	4,000
		Total	22,500

Distribution of Eastern Brook Trout.

Geo. Neale	Aug. 21	Mill Creek	6,000
Geo. Neale	Aug. 21	Battle Creek	6,000
H. H. Zimmerman	Aug. 28	Mill Creek	4,000
		Total	16,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
C. W. De Long	July 8	Mill Creek	5,000
J. A. Owen	July 8	South Fork of Cottonwood Creek	5,000
Casper Ehorn	July 8	Maple Creek	2,500
Walter Stoll	Aug. 14	Elder Creek	4,000
A. B. McCollum	Aug. 21	Deer Creek	5,000
H. H. Zimmerman	Aug. 28	Mill Creek	4,000
E. C. Powell	Aug. 28	Antelope Creek	14,000
Andrew Shafer	Sept. 8	Upper Antelope Creek	20,000
		Total	59,500

TRINITY COUNTY.

Distribution of Rainbow Trout.

C. E. Carr	Oct. 11	Trinity River	8,000

TULARE COUNTY.

Distribution of Steelhead Trout.

Porterville Fish and Game Association	Sept. 3	South Tule River	10,000
Tule River Fishing and Shooting Association	Sept. 3	Tule River	16,000
Deer Creek Fish and Game Protective Association	Sept. 3	Tyler Creek	8,000
Deer Creek Fish and Game Protective Association	Sept. 3	Deer Creek	8,000
C. A. Kirkpatrick	Sept. 3	Tule River	8,000
Ed Cramer	Sept. 3	White River	3,000
Ed Cramer	Sept. 3	Upper Peale River	3,000
H. M. Berry	Sept. 3	Posey Creek	6,000
		Total	62,000

Distribution of Loch Leven Trout.

Porterville Fish and Game Association	Sept. 3	Kissing Creek	4,000
Deer Creek Fish and Game Protective Association	Sept. 3	Tyler Creek	5,000
Deer Creek Fish and Game Protective Association	Sept. 3	Deer Creek	5,000
Ed Cramer	Sept. 3	White River	3,000
Ed Cramer	Sept. 3	Upper Peale River	3,000
H. M. Berry	Sept. 3	Posey Creek	6,000
		Total	26,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
Porterville Fish and Game Association	Sept. 8	South Tule River	9,000
Porterville Fish and Game Association	Sept. 8	Kissing Creek	11,000
Tule River Fishing and Shooting Association	Sept. 8	Tule River	18,000
Deer Creek Fish and Game Protective Association	Sept. 8	Deer Creek	5,000
Deer Creek Fish and Game Protective Association	Sept. 8	Tyler Creek	5,000
C. A. Kirkpatrick	Sept. 8	Tule River	8,000
		Total	56,000

TUOLUMNE COUNTY.

Distribution of Steelhead Trout.

Lewis Elliott	Sept. 9	Stanislaus River	10,000
Sierra & S. F. Power Co.	Sept. 9	Indian Creek	7,000
Geo. F. Conlin	Sept. 9	Stanislaus River, south fork	12,000
Board of Supervisors, Tuolumne County	Sept. 9	Tuolumne River, south fork	12,000
Board of Supervisors, Tuolumne County	Sept. 9	Tuolumne River, north fork	8,000
Board of Supervisors, Tuolumne County	Sept. 14	Tuolumne River, north fork	10,000
Board of Supervisors, Tuolumne County	Sept. 14	Sullivans Creek	12,000
Board of Supervisors, Tuolumne County	Sept. 14	Stanislaus River, main waters	4,000
		Total	75,000

Distribution of Black Spotted Trout.

Lewis Elliott	Sept. 9	Stanislaus River	3,000
Lewis Elliott	Sept. 9	Rose Creek	3,000
Sierra & S. F. Power Co.	Sept. 9	Stanislaus River, at power house	15,000
		Total	21,000

Distribution of Loch Leven Trout.

Lewis Elliott	Sept. 9	Stanislaus River	4,000
Geo. F. Conlin	Sept. 9	Stanislaus River, south fork	4,000
Board of Supervisors, Tuolumne County	Sept. 9	Stanislaus River, main waters	10,000
Board of Supervisors, Tuolumne County	Sept. 9	Releaf Stream	20,000
		Total	38,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Eastern Brook Trout.

Applicant	Date	Water stocked	Number
Geo. F. Conlin	Sept. 9	Stanislaus River, south fork	4,000

Distribution of Rainbow Trout.

Lewis Elliott	Sept. 9	Main Fork of Stanislaus River	4,000
Sierra & S. F. Power Co.	Sept. 9	Forebay, Stanislaus River	15,000
Sierra & S. F. Power Co.	Sept. 9	Sand Bar Dam, Stanislaus River	15,000
Geo. F. Conlin	Sept. 9	Stanislaus River, south fork	8,000
Board of Supervisors, Tuolumne County	Sept. 9	Tuolumne River, south fork	20,000
Board of Supervisors, Tuolumne County	Sept. 9	Tuolumne River, north fork	16,000
Board of Supervisors, Tuolumne County	Sept. 14	Tuolumne River, north fork	6,000
Board of Supervisors, Tuolumne County	Sept. 14	Crow Creek	4,000
Board of Supervisors, Tuolumne County	Sept. 14	Stanislaus River, main waters	34,000
		Total	122,000

VENTURA COUNTY.

Distribution of Quinnat Salmon.

J. J. Barnett	Oct. 8	Ventura River	25,000

Distribution of Steelhead Trout.

Geo. Rissman	Oct. 7	Sisar Creek	4,000
G. C. Hollister	Oct. 8	Agua Blanca Creek	10,000
J. J. Barnett	Oct. 8	Ventura River	50,000
J. J. Barnett	Oct. 8	San Antonio Creek	25,000
J. J. Barnett	Oct. 8	Coyote Creek	25,000
J. J. Barnett	Oct. 8	Seesaw Creek	8,000
Elkins & Temple	Oct. 8	Hopper Creek	4,000
W. W. Wilcox	Oct. 8	North Fork of Matilya River	10,000
W. W. Wilcox	Oct. 8	North Fork of Matilya River	6,000
J. J. Barnett	Oct. 21	Ventura River	12,000
J. J. Barnett	Oct. 21	San Antonio Creek	48,000
H. I. Pritchard	Oct. 22	Sespe River	20,000
		Total	222,000

Distribution of Loch Leven Trout.

W. W. Laidley	Sept. 8	Seymore Creek	6,000
T. E. Klipstein	Oct. 5	Seymore Creek	4,000
		Total	10,000

SISSON HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

STATE OF NEVADA.

Distribution of Rainbow Trout.

Applicant	Date	Water stocked	Number
W. W. Laidley	Sept. 8	Seymore Creek	4,000
T. E. Klipstein	Oct. 5	Lockwood Creek	4,000
J. J. Barnett	Oct. 8	North Fork	2,000
J. J. Barnett	Oct. 8	Reyes Creek	2,000
W. W. Wilcox	Oct. 8	North Fork of Matilya River	2,000
		Total	14,000

Distribution of Silver Salmon Eggs.

Nevada State Fish Commission	Feb. 14	Planted in state of Nevada	100,000

STATE OF OREGON.

Distribution of Black Spotted Trout.

James Withycombe	July 2	Wallowa Lake in eastern Oregon	100,000

PONDS, SISSON HATCHERY.

Rainbow Trout, Retained in Ponds.

Fish and Game Com.	Oct. 20	Retained in ponds at Sisson Hatchery	130,000

TAHOE HATCHERY.

Fish Distribution by Counties. Season 1915.

ALPINE COUNTY.

Distribution of Black Spotted Trout.

Grant P. Merrill	Aug. 17	East Carson (Silver Creek)	6,000
Grant P. Merrill	Aug. 17	East Carson (Hot Spring Creek)	6,000
Grant P. Merrill	Aug. 17	West Carson (Woodford Canyon)	21,000
Grant P. Merrill	Aug. 17	West Carson (Hope Valley)	12,000
Grant P. Merrill	Aug. 17	West Carson (near Woodfords)	6,000
Chas. W. Tryon	Aug. 17	Silver Ring Creek	12,000
Chas. W. Tryon	Aug. 17	Wolf Creek	6,000
Chas. W. Tryon	Aug. 17	North Fork of Mokelumne River	6,000
		Total	75,000

TAHOE HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

EL DORADO COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Fish and Game Com.	June 23	Power House Ditch	40,000
Fish and Game Com.	June 26	Tallac Creek	100,000
Fish and Game Com.	June 26	Power House Ditch	50,000
Fish and Game Com.	June 27	Taylor Creek	100,000
Fish and Game Com.	June 28	Tallac Creek Slough	95,000
Fish and Game Com.	June 29	Tallac Creek Slough	100,000
Fish and Game Com.	June 29	Green Bay, Fallen Leaf Lake	100,000
Fish and Game Com.	June 29	Cascade Lake	100,000
Fish and Game Com.	June 30	Tallac Creek Slough	74,000
Fish and Game Com.	July 8	Taylor Creek	100,000
Fish and Game Com.	July 11	Tallac Creek	100,000
Fish and Game Com.	July 11	Cascade Lake	100,000
Glen Alpine Co.	July 12	Susie Lake	40,000
Glen Alpine Co.	July 13	Grass Lake	40,000
Glen Alpine Co.	July 14	Cascade Lake	96,000
Glen Alpine Co.	July 14	Half Moon Lake	40,000
Fish and Game Com.	July 15	Fallen Leaf Lake	50,000
Fish and Game Com.	July 15	Little Truckee River	50,000
Glen Alpine Co.	July 15	Gilmore Lake	40,000
Fish and Game Com.	July 16	Little Truckee River	100,000
Glen Alpine Co.	July 16	Susie Lake	20,000
Glen Alpine Co.	July 16	Grass Lake	20,000
Fish and Game Com.	July 17	Tallac Creek Slough	100,000
Al Tahoe Co.	July 18	Trout Creek	25,000
Fish and Game Com.	July 19	Little Truckee River	90,000
Fish and Game Com.	July 19	Taylor Creek	24,000
Fish and Game Com.	July 29	Meiggs Bay Creek	25,000
C. T. Bradley	Sept. 20	Emerald Bay	25,000
E. G. Schmiedel	Oct. 3	Rabbit Lake	12,000
		Total	1,856,000

NEVADA COUNTY.

Distribution of Black Spotted Trout.

James McIver	Aug. 31	Donner Creek	15,000
Truckee Chamber of Com.	Sept. 9	Donner Lake	25,000
Truckee Chamber of Com.	Sept. 10	Donner Lake	25,000
Truckee Chamber of Com.	Sept. 11	Donner Lake	25,000
E. J. Baldwin	Sept. 18	Donner Lake	30,000
E. F. Stewart	Sept. 23	West Lakes	15,000
H. N. Freeman	Sept. 24	Lakes on ridge above Lake Sterling	50,000
Joseph Gouling and John Sherrett	Sept. 24	Lake Sherrett	18,000
		Total	203,000

TAHOE HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

PLACER COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Fish and Game Com.	Aug. 27	Slim Jim Creek	50,000
Tahoe Vista Hotel Co.	Aug. 30	Griff Creek	25,000
Fish and Game Com.	Sept. 13	Lake Tahoe, near Island Park	30,000
Fish and Game Com.	Sept. 17	Lake Tahoe, near Island Park	50,000
Fish and Game Com.	Sept. 21	Machine Shop Creek	30,500
E. R. Rees	Sept. 23	Crystal Lake	12,000
Fish and Game Com.	Sept. 25	Burton Creek Slough	22,500
Fish and Game Com.	Sept. 28	Burton Creek Slough	25,000
Fish and Game Com.	Sept. 30	Lake Tahoe, near car barns	20,000
Fish and Game Com.	Oct. 1	Lake Tahoe, source of Truckee River	30,000
Fish and Game Com.	Oct. 4	Burton Creek Slough	20,000
Fish and Game Com.	Oct. 6	Blackwood Creek	30,000
Fish and Game Com.	Oct. 8	Ward Creek	35,000
Fish and Game Com.	Oct. 11	Tahoe Lake, Island Park Tules	25,000
Fish and Game Com.	Oct. 12	Ward Creek	25,000
H. N. Freeman	Oct. 12	Lake Stirling	20,000
Fish and Game Com.	Oct. 12	Slim Jim Creek	14,000
		Total	464,000

SIERRA COUNTY.

Distribution of Black Spotted Trout.

Webber Lake Club	Sept. 7	Webber Lake and Inlet	60,000

BROOKDALE HATCHERY.

Fish Distribution by Counties. Season 1915.

MONTEREY COUNTY.

Distribution of Steelhead Trout.

J. L. Roberts	July 7	Garrapatis Creek	3,000
J. L. Roberts	July 7	Mill Creek	3,000
J. L. Roberts	July 7	Serra Hill Creek	2,000
J. L. Roberts	July 7	Rocky Creek	2,000
J. L. Roberts	July 7	North Fork of Little River	5,000
J. L. Roberts	July 7	South Fork of Little River	5,000
J. L. Roberts	July 7	Big Sur River	10,000
A. H. Abbott	July 13	Arroyo Seco	30,000
J. L. Roberts	Aug. 5	Lower Carmel	45,000
J. L. Roberts	Aug. 7	Pola Colorado	3,000
J. L. Roberts	Aug. 7	Rocky Creek	3,000
J. L. Roberts	Aug. 7	Mill Creek	4,500
J. L. Roberts	Aug. 7	Little Sur River	12,000
J. L. Roberts	Aug. 7	Big Sur River	22,500
		Total	150,000

BROOKDALE HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SANTA CLARA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
I. L. Koppel	July 15	Trout Creek	2,000
I. L. Koppel	July 15	Waible Creek	2,000
I. L. Koppel	July 15	Ysabel Creek	6,000
I. L. Koppel	July 15	Arroyo Honda	5,000
I. L. Koppel	July 17	Stevens Creek	15,000
I. L. Koppel	July 17	San Francisquito Creek	5,000
I. L. Koppel	July 19	Almaden and tributaries	15,000
I. L. Koppel	July 20	Saratoga and Quito	12,000
I. L. Koppel	July 20	Van Ness Creek	5,000
I. L. Koppel	July 20	Booker Creek	5,000
I. L. Koppel	July 21	Llagas and tributaries	22,000
I. L. Koppel	July 22	Lower Coyote	8,000
I. L. Koppel	July 22	Los Animas	6,000
I. L. Koppel	July 22	Packwood	8,000
I. L. Koppel	July 22	Laurel Creek	3,000
I. L. Koppel	July 24	Stevens Creek	7,000
I. L. Koppel	July 24	Borde Creek	5,000
I. L. Koppel	July 24	Right Fork	5,000
I. L. Koppel	July 24	Left Fork	5,000
I. L. Koppel	July 25	Silver Creek	2,000
I. L. Koppel	July 25	San Felipe	10,000
I. L. Koppel	July 25	Dry Creek	3,000
I. L. Koppel	July 26	Alum Rock and Penetentia	13,000
I. L. Koppel	July 26	Bonita	3,000
I. L. Koppel	July 26	Ysabel and Arroyo Honda	6,000
I. L. Koppel	July 27	Uvas	15,000
I. L. Koppel	July 27	Little Arthur	3,000
I. L. Koppel	July 29	Long Bridge Creek	6,000
I. L. Koppel	July 29	Sweigert Creek	4,500
I. L. Koppel	July 29	Little Uvas Creek	4,500
I. L. Koppel	July 29	Ayer's Creek, Sargent	8,000
I. L. Koppel	July 29	Coyote Creek, Gilroy Hot Springs Branch	4,000
I. L. Koppel	July 29	Murphy Creek and Bodfish	4,000
F. Marriott	July 25	Uvas Creek	10,000
Los Gatos Fish and Game Protective Association	July 11	Cavanaugh Creek	5,000
Los Gatos Fish and Game Protective Association	July 11	Lyndon Creek	3,000
Los Gatos Fish and Game Protective Association	July 11	Austin	3,000
Los Gatos Fish and Game Protective Association	July 11	Hooker	5,000
Los Gatos Fish and Game Protective Association	July 24	Guadalupe Creek	12,000
E. L. Coldron	July 21	Los Gatos Creek	10,000
		Total	265,000

SANTA CRUZ COUNTY.

Distribution of Silver Salmon.

Santa Cruz Co.	Mar. 21	San Lorenzo River	28,000
Santa Cruz Co.	April 11	Scott Creek	25,000
Santa Cruz Co.	April 12	San Lorenzo River	18,000
		Total	71,000

TAHOE HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Santa Cruz Co.	May 20	Love Creek	10,000
Santa Cruz Co.	May 21	Upper San Lorenzo River	18,000
Santa Cruz Co.	May 22	Kings Creek	12,000
Santa Cruz Co.	May 22	Two Bar Creek	6,000
Santa Cruz Co.	May 23	Fall Creek	17,000
Santa Cruz Co.	May 23	Newell Creek	16,000
Santa Cruz Co.	May 24	Bear Creek	12,000
Santa Cruz Co.	May 24	Deer Creek	8,000
Santa Cruz Co.	May 25	Jamison Creek	8,000
Santa Cruz Co.	May 25	Boulder Creek	12,000
Santa Cruz Co.	May 25	Scotts Creek	10,000
Santa Cruz Co.	May 26	Wadell Creek	22,000
Santa Cruz Co.	May 26	Sempervirens	8,000
Santa Cruz Co.	May 27	Zayante No. 5	2,000
Santa Cruz Co.	May 27	Felton Reservoir Creek	2,000
Santa Cruz Co.	May 27	Bean Creek	8,000
Santa Cruz Co.	May 27	Granite Creek	6,000
Santa Cruz Co.	May 28	Lompico Creek	10,500
Santa Cruz Co.	May 28	Gold Gulch Creek	4,500
Santa Cruz Co.	May 29	Branciforte Creek	15,000
Santa Cruz Co.	May 29	Laurel Glenn Creek	10,000
Santa Cruz Co.	May 30	Big Creek	10,000
Santa Cruz Co.	May 30	Mill Creek	10,000
Santa Cruz Co.	June 2	Wilders Creek	5,000
Santa Cruz Co.	June 2	Majors Creek	3,000
Santa Cruz Co.	June 2	Santa Cruz City Reservoir	2,000
Santa Cruz Co.	June 4	Hubbard Gulch Creek	7,500
Santa Cruz Co.	June 4	Shingle Mill Creek	2,500
Santa Cruz Co.	June 4	Big Tree Creek	2,000
Santa Cruz Co.	June 6	Laguna Creek	18,000
Santa Cruz Co.	June 6	Lidell Creek	9,000
Santa Cruz Co.	June 6	Coja Creek	6,000
Santa Cruz Co.	June 8	Glenn Canyon Creek	4,500
Santa Cruz Co.	June 8	Branciforte Creek, west fork	7,500
Santa Cruz Co.	June 9	Tunnel Creek	4,000
Santa Cruz Co.	June 9	Soquel Creek, west fork	14,000
Santa Cruz Co.	June 10	Amaya Creek	8,000
Santa Cruz Co.	June 10	Hester Creek	8,000
Santa Cruz Co.	June 11	Bean Creek	10,000
Santa Cruz Co.	June 11	Zayante Creek	12,000
Santa Cruz Co.	June 13	Big Creek	7,000
Santa Cruz Co.	June 13	San Vincente Creek	18,000
Santa Cruz Co.	June 14	Big Creek	6,000
Santa Cruz Co.	June 14	Boyer Creek	9,000
Santa Cruz Co.	June 14	Mill Creek	6,000
Santa Cruz Co.	June 17	Shingle Mill Creek	10,000
Santa Cruz Co.	June 18	Eureka Canyon Creek	4,000
Santa Cruz Co.	June 18	Shingle Mill Creek	2,000
Santa Cruz Co.	June 18	Diablo Creek	6,000
William McGrath	June 18	Cassuly	6,000
Santa Cruz Co.	June 19	Brown Valley Creek	10,000
Santa Cruz Co.	June 21	Soquel Creek	12,000
Santa Cruz Co.	June 22	Brown Valley Creek	14,000
Santa Cruz Co.	June 23	Pescadero Creek	12,000
Santa Cruz Co.	June 25	Aptos Creek	10,000
Santa Cruz Co.	June 25	Valencia Creek	8,000
Santa Cruz Co.	July 21	Hester Creek	2,000
Fish and Game Com.	Aug. 2	Scotts Creek	45,000
Fish and Game Com.	Aug. 3	Scotts Creek	45,000
S. C. Marcus	Aug. 5	Soquel Creek	14,000
S. C. Marcus	Aug. 5	Diablo Creek	2,000
Fish and Game Com.	Aug. 9	San Lorenzo River	47,000
		Total	655,000

BEAR VALLEY STATION.

Fish Distribution by Counties. Season 1915.

SAN BERNARDINO COUNTY.

Distribution of Black Spotted Trout.

Applicant	Date	Water stocked	Number
Fish and Game Com.	July 18	Bear Lake, Big	120,000
Fish and Game Com.	July 20	Bear Lake, Big	120,000
		Total	240,000

Distribution of Rainbow Trout.

Fish and Game Com.	July 8	Grays Meadows	3,000
Fish and Game Com.	July 8	Deer Creek	9,000
Fish and Game Com.	July 8	Upper Santa Ana	21,000
Fish and Game Com.	July 9	Bear Creek, below the dam	50,000
Fish and Game Com.	July 10	Bear Creek, below the dam	10,000
Fish and Game Com.	July 10	Deer Creek	30,000
Fish and Game Com.	July 11	Bear Lake	10,000
Fish and Game Com.	July 11	Huston Creek	25,000
Fish and Game Com.	July 11	Seeley Creek	5,000
Fish and Game Com.	July 11	Dark Canyon	10,000
Fish and Game Com.	July 18	Bear Lake, Big	120,000
Fish and Game Com.	July 20	Bear Lake, Big	120,000
		Total	413,000

PRICE CREEK HATCHERY.

Fish Distribution by Counties. Season 1915.

HUMBOLDT COUNTY.

Distribution of Quinnat Salmon.

Arcata Chamber of Com.	Mar. 31	Mad River	70,000
Humboldt Chamber Com.	April 1	Freshwater	70,000
Arcata Chamber of Com.	April 3	Mad River	70,000
Eureka Chamber of Com.	April 4	Jacoby Creek	70,000
Fish and Game Com.	April 5	Price Creek	300,000
Eureka Chamber of Com.	April 6	Elk River	70,000
Arcata Chamber of Com.	April 7	Mad River	70,000
Eureka Chamber of Com.	April 8	Elk River	70,000
Fish and Game Com.	April 8	Price Creek	200,000
Arcata Chamber of Com.	April 9	Mad River	70,000
Fish and Game Com.	April 9	Price Creek	143,500
Humboldt Chamber Com.	April 10	Freshwater	70,000
Arcata Chamber of Com.	April 12	Mad River	70,000
Humboldt Chamber Com.	April 13	Jacoby Creek	70,000
Humboldt Chamber Com.	April 14	Elk River	70,000
Fish and Game Com.	April 15	Eel River	100,000
Fish and Game Com.	April 15	Price Creek	50,000
Fish and Game Com.	April 16	Eel River	250,000
Fish and Game Com.	April 16	Price Creek	50,000
Fish and Game Com.	April 17	Eel River	250,000
Fish and Game Com.	April 17	Price Creek	50,000
Fish and Game Com.	April 18	Eel River	250,000
Fish and Game Com.	April 18	Price Creek	50,000
Fish and Game Com.	April 19	Price Creek	200,000
Fish and Game Com.	April 20	Price Creek	234,650
		Total	2,968,150

PRICE CREEK HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
Humboldt Chamber Com.	April 1	Jacoby Creek	70,000
Eureka Chamber of Com.	April 3	Elk River	30,000
Eureka Chamber of Com.	April 4	Elk River, South Fork and Little South Fork	40,000
Fish and Game Com.	April 5	Freshwater	70,000
Eureka Chamber of Com.	April 6	Elk River	70,000
Arcata Chamber of Com.	April 7	Freshwater	70,000
Eureka Chamber of Com.	April 8	Elk River	70,000
Fish and Game Com.	April 8	Mad River	70,000
Arcata Chamber of Com.	April 9	Mad River	70,000
Fish and Game Com.	April 9	Maple Creek	70,000
Humboldt Chamber Com.	April 10	Huntly Creek	70,000
Arcata Chamber of Com.	April 12	Redwood Creek	70,000
Humboldt Chamber Com.	April 13	Price Creek	27,000
Humboldt Chamber Com.	April 14	Howe Creek	50,000
		Total	847,000

UKIAH HATCHERY.

LAKE COUNTY.

Distribution of Steelhead Trout.

Mountain Imp. Club	June 30	Cold Creek	15,000
Mountain Imp. Club	July 7	Cold Creek and tributaries	15,000
Fish and Game Com.	July 29	Little Sulphur Creek	25,000
J. B. Robinson	July 31	Clover Creek	30,000
		Total	85,000

MENDOCINO COUNTY.

Distribution of Steelhead Trout.

B. M. Bucknell	June 13	Robinson Creek	30,000
Fish and Game Com.	June 14	Jack Smith Creek	40,000
W. A. Graham	June 15	Walker Creek	20,000
Fish and Game Com.	June 16	Russian River (below mouth of Cold Creek)	25,000
Bob Jones	June 16	Vichy Creek	25,000
Fish and Game Com.	June 17	Cold Creek	25,000
Fish and Game Com.	June 22	Orr Creek	30,000
Mendocino State Hospital	June 22	Mill Creek	20,000
J. W. Harris	June 29	Feliz Creek	25,000
Fish and Game Com.	June 30	Seward Creek	30,000
Fish and Game Com.	July 1	Reeves Canyon Creek	30,000
Fish and Game Com.	July 2	Ackerman Creek	25,000
J. W. Harris	July 3	Cummiskey Creek	8,000
J. W. Harris	July 3	Vassar Creek	17,000
Fish and Game Com.	July 12	Walker Valley Creek	35,000
Mendocino State Hospital	July 13	Mill Creek, south	15,000
Fish and Game Com.	July 15	Big River (Orrs Hot Springs)	35,000
Fish and Game Com.	July 16	Redwood Valley Creek	30,000
W. A. Graham	July 16	Walker Creek	15,000
F. W. Harmon	July 17	Sherwood Creek	15,000
C. E. Black	July 23	Woodman Creek	12,000
		Total	507,000

UKIAH HATCHERY—Continued.

Fish Distribution by Counties. Season 1915.

SONOMA COUNTY.

Distribution of Steelhead Trout.

Applicant	Date	Water stocked	Number
J. A. McMinn	June 23	Little Sulphur	20,000
J. A. McMinn	June 28	Warm Spring	26,000
J. A. McMinn	June 23	Mill Creek	24,000
J. M. Alexander	July 7	Mill Creek	17,500
J. M. Alexander	July 7	Warm Spring	17,500
J. M. Alexander	July 7	Little Sulphur	15,000
Fish and Game Com.	July 21	Sulphur Creek	40,000
Fish and Game Com.	July 27	Sulphur Creek	24,000
		Total	184,000

SNOW MOUNTAIN STATION.

LAKE COUNTY.

Distribution of Steelhead Trout.

Fish and Game Com.	June 19	Soda Creek	10,000
Fish and Game Com.	June 19	Panther Creek	10,000
		Total	20,000

MENDOCINO COUNTY.

Distribution of Steelhead Trout.

Fish and Game Com.	June 6	Whitney Creek (above fourth falls)	12,000
Fish and Game Com.	June 17	Whitney Creek	35,000
Fish and Game Com.	June 18	Trout Creek (two miles above dam)	40,000
Fish and Game Com.	June 18	Eel River (above fork from Snow Mountain)	75,000
Sam Holms	June 18	Mill Creek	50,000
Fish and Game Com.	June 20	Whitney Creek	50,000
Fish and Game Com.	June 20	Russian River (near power plant)	30,000
		Total	292,000

Summary of the Number of Fish Eggs Taken and the Number of Fry Which Will be Available for Distribution During the Season 1916.

Species	Eggs	Estimated loss	Shipped to other stations	Estimated number available for distribution	Estimated total available for distribution
Sisson Hatchery.					
Rainbow trout	2,227,740	287,740		1,940,000	
Eastern brook trout	2,227,000	155,000		2,072,000	
Loch Leven trout	1,839,000	109,000	125,000	1,605,000	
Black spotted trout	975,000	25,000		950,000	
Steelhead trout	3,036,000	95,000		2,941,000	
German brown trout	100,000	11,000		89,000	
					9,597,000
Quinnat salmon	18,398,340	398,340		18,000,000	18,000,000
Total					27,597,000
Tahoe Hatcheries.					
Black spotted trout	4,102,700	217,700	1,116,000	2,769,000	
Rainbow trout	240,000	25,000		215,000	
					2,984,000
Fort Seward Hatchery.					
Steelhead trout	1,002,000	77,000		925,000	
Black spotted trout	141,000	8,000		133,000	
Rainbow trout	105,000	10,000		95,000	
					1,153,000
Brookdale Hatchery.					
Steelhead trout	1,994,000	439,000	678,000		877,000
Ukiah Hatchery.					
Steelhead trout	556,000	111,000		445,000	445,000
Quinnat salmon	1,000,000	44,000		956,000	956,000
Snow Mountain Station.					
Steelhead trout	4,642,000	543,000	3,915,000	184,000	184,000
Bear Valley Hatchery.					
Rainbow trout	1,286,000	536,000		750,000	750,000
Almanor Hatchery.					
Rainbow trout	1,635,000	148,212	1,285,000	201,788	201,788
Marlett Lake-Carson Hatchery.					
Eastern brook trout	694,000	57,000	527,000	110,000	110,000
Total trout					16,301,788
Total salmon					18,956,000

STATE GAME FARM, HAYWARD.

Distribution, Sale, Liberation, etc., of Game Birds. July 1, 1914, to June 30,

Date	Applicant	Address	Pheasants	Quail
July 1, 1914	P. Verzic	Hayward, Alameda County	2	
Aug. 28, 1914	Mrs. M. Stephens	Alameda, Alameda County	2	
Aug. 31, 1914	A. H. Hesse	Mt. Eden, Alameda County	2	
Jan. 6, 1915	John Penke	Mt. Eden, Alameda County	2	
Jan. 7, 1915	Mrs. D. Gansberger	San Lorenzo, Alameda County	2	
Jan. 12, 1915	Jacob Harder, Jr.	Hayward, Alameda County	5	
Jan. 27, 1915	Miss C. Pestdorf	Hayward, Alameda County	1	
Feb. 10, 1915	R. H. Heger	Oakland, Alameda County	1	
Feb. 28, 1915	John Penke	Mt. Eden, Alameda County	2	
Mar. 5, 1915	Jacob Harder, Jr.	Hayward, Alameda County	1	
Mar. 9, 1915	Mr. Stevens	Alameda, Alameda County	2	
Mar. 10, 1915	A. H. Hesse	Mt. Eden, Alameda County	1	
Mar. 11, 1915	C. R. King	Hayward, Alameda County	1	
April 11, 1915	A. Vanderbilt	Oakland, Alameda County	1	
May 17, 1915	A. H. Hesse	Mt. Eden, Alameda County	1	
May 18, 1915	Jos. Sanders	Oakland, Alameda County	*15	
May 23, 1915	Percy Oliveira	San Lorenzo, Alameda County	*12	
July 29, 1915	M. Curtiss	Oakland, Alameda County		12
Aug. 2, 1915	E. W. Gifford	Oakland, Alameda County		
Oct. 11, 1915	Peoples Water Co.	Oakland, Alameda County	50	
Nov. 28, 1915	Peter M Verzic	Hayward, Alameda County	2	
Dec. 23, 1915	A. H. Hesse	Mt. Eden, Alameda County	1	
Feb. 9, 1916	Bert L. Curtiss	Oakland, Alameda County	1	
Mar. 12, 1916	Bert L. Curtiss	Oakland, Alameda County	1	
Mar. 11, 1916	Dr. J. A. Plunkett	Oakland, Alameda County		1
Mar. 18, 1916	J. I. Sedgley	Alameda, Alameda County	3	
Mar. 24, 1916	Jacob Harder, Jr.	Hayward, Alameda County	12	
Mar. 25, 1916	Dr. C. J. Schilling	Oakland, Alameda County	1	
Mar. 25, 1916	Heger & Harris	Oakland, Alameda County	2	
April 3, 1916	Arthur Manter	Hayward, Alameda County	2	
May 15, 1916	Dr. C. J. Schilling	Oakland, Alameda County		1
Feb. 8, 1915	Chas. R. Wells	Fourth Crossing, Calaveras County	1	
Oct. 21, 1915	A. V. Lisenby	Fresno, Fresno County	1	
Nov. 9, 1915	A. D. Ferguson	Fresno, Fresno County	25	
April 25, 1916	A. H. Brown	Fresno, Fresno County	2	
Mar. 1, 1915	C. W. Kellogg	Bakersfield, Kern County		1
Mar. 18, 1915	S. K. Tevis	Bakersfield, Kern County	6	
Mar. 29, 1915	T. C. Dodge	Bakersfield, Kern County	2	
Aug. 30, 1915	E. W. Smalley	Hanford, Kings County	4	
Mar. 17, 1916	W. H. Roberts	Seigler Springs, Lake County	8	
Aug. 11, 1914	A. G. Wild	Los Angeles, Los Angeles County	2	
Aug. 28, 1914	A. G. Wild	Los Angeles, Los Angeles County	3	
Oct. 14, 1915	J. B. Lampman	Pasadena, Los Angeles County		1
Feb. 14, 1916	S. A. Denker	Los Angeles, Los Angeles County	8	
Mar. 2, 1916	S. M. Morgan	Los Angeles, Los Angeles County	2	
Mar. 20, 1916	J. B. Lampman	Pasadena, Los Angeles County	1	
May 1, 1916	S. A. Denker	Los Angeles, Los Angeles County	1	
Dec. 1, 1915	Madera County Park	Madera, Madera County	2	
Aug. 8, 1915	A. J. Molera	Monterey, Monterey County	50	
Aug. 16, 1915	P. H. Oyer	Pacific Grove, Monterey County	25	
Nov. 10, 1915	P. H. Oyer	Pacific Grove, Monterey County	1	
Nov. 15, 1915	J. H. Hill	Watsonville, Monterey County	30	
Mar. 2, 1915	F. W. Kiesel	Sacramento, Sacramento County	12	
July 12, 1915	F. W. Kiesel	Sacramento, Sacramento County	100	
July 30, 1915	Geo. Thisby	Walnut Grove, Sacramento County	25	
Aug. 12, 1915	State Agr. Society	Sacramento, Sacramento County	6	
Aug. 27, 1915	State Agr. Society	Sacramento, Sacramento County		6
Dec. 27, 1915	F. W. Kiesel	Sacramento, Sacramento County	10	
Mar. 22, 1916	Jack Hinters	Sacramento, Sacramento County	1	
Jan. 25, 1915	Tom Hawkins	Hollister, San Benito County	5	
Mar. 15, 1916	Jas. N. Colomb	San Francisco (liberated in San Benito County)	10	

STATE GAME FARM, HAYWARD—Continued.

Distribution, Sale, Liberation, etc., of Game Birds. July 1, 1914, to June 30, 1916.

Date	Applicant	Address	Pheasants	Quail	Miscellaneous
Mar. 29, 1916	Paicines Ranch Co.	Paicines, San Benito County	77		
April 9, 1915	J. Kappler	San Francisco	------	1	
Aug. 18, 1915	Dr. Stephen Piper	San Francisco	------	1	
Oct. 8, 1915	U. S. Naval Station	Goat Island, San Francisco County	22		
Oct. 22, 1915	Federal Laboratory	San Francisco	------	12	
Feb. 25, 1916	Chas. F. Breidenstein	San Francisco	------	------	3
April	Theo. Kytka	San Francisco	------	------	1
Oct. 31, 1914	J. P. Andrews	San Luis Obispo, San Luis Obispo Co.	12		
Dec. 8, 1914	J. P. Andrews	San Luis Obispo, San Luis Obispo Co.	4		
Jan. 2, 1915	Wm. Hagedorn	Menlo Park, San Mateo County	4		
Feb. 10, 1915	Wm. Hagedorn	Menlo Park, San Mateo County	1	------	5
Aug. 20, 1915	Herbert S. Rothchild	San Mateo, San Mateo County	2		
Dec. 9, 1914	H. M. Noble	San Jose, Santa Clara County	1		
Dec. 22, 1914	Geo. Dellwigg	San Jose, Santa Clara County	------	1	
Feb. 26, 1915	G. E. Rea	Gilroy, Santa Clara County	2		
Nov. 10, 1915	I. L. Koppel	San Jose, Santa Clara County	40		
Oct. 13, 1914	H. A. Hyde	Watsonville, Santa Cruz County	2		
Jan. 11, 1915	H. A. Hyde	Watsonville, Santa Cruz County	1		
April 17, 1916	A. J. Nakken	Santa Cruz, Santa Cruz County	2		
Oct. 18, 1915	F. G. Baum	Cassel, Shasta County	36		
Nov. 15, 1915	J. W. Long	Baird, Shasta County	12		
Aug. 29, 1915	Fish and Game Com.	Liberated in Siskiyou County	100		
Mar. 18, 1915	Gene M. Simpson	Corvallis, Oregon	12		
Dec. 6, 1915	S. Thurston Ballard	Louisville, Kentucky	------	12	
Dec. 20, 1915	Wm. J. Mackensen	Yardley, Pennsylvania	------	------	6
Jan. 28, 1916	Wm. J. Mackensen	Yardley, Pennsylvania	------	24	
Mar. 27, 1916	F. B. Stewart	Paradise Valley, Nevada	8		
		Totals	777 *27	73	16

*Eggs.

Statement of Lion Bounties Paid by Fish and Game Commission, from October, 1907, to June 30, 1916.

Counties	1907	1908	1909	1910	1911	1912	1913	1914	1915	January 1 to June 30, 1916	Total
Alameda		1								1	2
Alpine									1		1
Amador		3		1	2	2					8
Butte	2	11	5	2	4	3	2	1			30
Calaveras		1	4	1		1		1	3		11
Colusa		3		3	3	1	1	2	1		14
Del Norte		10	12	4	11	11	23	4	2	3	80
Eldorado	2	7	2	1	8	9	6	1		1	37
Fresno		1	3	1		4		1	1		11
Glenn		13	6	6	1	4	5	1			36
Humboldt	10	113	67	71	42	50	41	46	26	27	493
Imperial									1		1
Inyo						1		1	3	1	6
Kern		8	10	12	5	9	10	5	15	7	81
Lake	2	14	11	13	9	10	7	5	8	1	80
Lassen			1		2	1	2				6
Los Angeles		7	1	2	2		2	5	5		24
Madera		3	5	1		1	1	9	10		30
Mariposa	2	4	3	6	2	1	4	9	2	13	46
Mendocino	5	44	18	11	16	17	24	15	7	7	164
Merced				1							1
Modoc			1	1	1						3
Monterey		14	11	7	1	3	9	8	3	4	60
Mono								2		5	7
Napa				1		2					3
Nevada		1	1	1						2	5
Orange			1	1	1		1				4
Placer		5	4	1	2	7	3	3	1	3	29
Plumas		2		3		1	2				8
Riverside		2	5			4	2			1	14
San Benito		1	2	1	2	11	3	2	2	3	27
San Bernardino		5	2	1	2		2	1	1		14
San Diego		3	5	5	8	3	1	2	1	1	29
San Joaquin									2		2
San Luis Obispo		11	5	9	4	4	5	7	10	1	56
San Mateo				1							1
Santa Barbara		7	24	7	3	5	11	4	4	1	66
Santa Clara			4			1	1	1	1	2	10
Santa Cruz				1							1
Shasta	1	25	32	31	29	28	22	9	7	7	191
Sierra		1				3	2				6
Siskiyou	1	31	35	45	25	25	22	31	9	5	229
Sonoma			2	4	1	4	1	2			14
Stanislaus			2		1				1		4
Sutter						1					1
Tehama	3	31	19	25	10	22	27	5	4		146
Trinity	9	86	34	32	22	15	14	13	4	2	231
Tulare		6	8	11	4	5	3	10	8	5	60
Tuolumne		6	10	5	2	4	1	2	7	8	45
Ventura		1	6	4	6	2		1	7		27
Yuba		1			2						3
Totals	37	482	361	333	233	275	260	204	162	111	2,458

Total bounty paid, at $20 per scalp $49,160

Seizures of Fish, Game, and Illegally Used Fishing Apparatus, July 1, 1914, to June 30, 1916.

Ducks	6,696	
Rabbits, cottontail, hare	468	
Deer meat	3,802	pounds
Deer hides and horns	83	
Doves	122	
Quail	432	
Nongame birds	558	
Geese	1,265	
Shore birds	120	
Tree squirrels	9	
Antelope	55	pounds
Traps	3	
Miscellaneous game	60	
Sea otter skin	1	
Illegally used fishing apparatus, nets, lines, etc.*	337	
Trout	5,293	pounds
Striped bass	3,900	pounds
Salmon	4,195	pounds
Sturgeon	195	pounds
Black bass	271	pounds
Crabs	4,546	
Crawfish or lobsters	886	
Crawfish traps	8	
Clams	2,291	
Abalones	1,576	
Fish traps	3	
Shrimp and shrimp shells	5,041	pounds
Miscellaneous fish	2,231	pounds

Illegally used fishing apparatus, after condemnation in superior courts, is destroyed or sold by the board in accordance with law. All wholesome fish and game is donated to public and charitable institutions, from whom many grateful letters of acknowledgment have been received.

During the period from July 1, 1914, to June 30, 1916, there were 512 searches of markets, restaurants, private individuals, conveyances, etc., for illegal fish and game, made by deputies.

*337 nets, lines, etc., represent about 12,668 fathoms or 76,008 feet.

Summary of Prosecutions for Violations of State Game Laws, July 1, 1914, to June 30, 1916.

Offense	Number of arrests	Convicted	Acquitted and dismissed	Pending	Sentence suspended and probation	Number of days imprisonment	Fines imposed	Fines collected
Violations hunting license law	424	384	34	6	19	140	$6,335 00	$5,897 50
Deer—killing, pursuing, possession, close season; excess bag limit	150	112	30	8	3	513	3,355 00	3,072 00
Female deer and fawns—killing and possession	60	41	17	2	3	168	2,725 00	1,782 00
Spiked bucks—killing and possession	17	15	2		1	200	650 00	450 00
Deer hides—female; evidence of sex removed; buying or selling (hides and meat); not exhibiting on request of officer (hides and horns)	27	23	3	1	1	180	814 00	749 00
Ducks—killing and possession, close season	30	22	8		3	68	595 00	452 00
Ducks—excess bag limit	44	27	16	1	7		615 00	610 00
Ducks—using a trained animal for taking; night shooting; shooting from power boat in motion	59	43	12	4	13		835 00	755 00
Quail—killing and possession, close season	83	78	5		1	45	2,115 00	1,920 00
Quail—excess bag limit; buying and selling	7	6	1		1		130 00	130 00
Doves—killing and possession, close season; excess bag limit	27	27			2	6	620 00	589 00
Snipe, curlew, rail, plover and other shore birds—killing, possession, close season; excess bag limit	33	33			1		800 00	775 00
Pheasants, swans; killing	10	9	1				240 00	240 00
Grouse, sage hen; killing and possession, close season; excess bag limit	12	12					300 00	275 00
Wild pigeons—killing and possession, close season	4	3	1		1	3	50 00	47 00
Antelope—killing	1		1					
Nongame birds—killing and possession	127	115	11	1	12	12½	1,504 50	1,380 50
Illegal trapping and possession of birds, without permit	6	6			1		110 00	110 00
Illegal shipping of game—not properly marked; concealed package	3		3					
Cottontail and bush rabbits—killing and possession, close season; excess bag limit	68	59	4		13	25	1,035 00	910 00
Tree squirrels—killing and possession, close season	16	10	6		1		250 00	225 00
Wild geese—killing and possession, close season	1	1					25 00	25 00
Sea otter in possession	1		1					
Total game cases	1,205	1,026	156	23	82	1,360½	$23,101 50	$20,394 00

Summary of Prosecutions for Violations of State Fish Laws, July 1, 1914, to June 30, 1916.

Offense	Number of arrests	Convicted	Acquitted and dismissed	Pending	Sentence suspended and probation	Number of days imprisonment	Fines imposed	Fines collected
Fishing (market) without a license	140	124	16		81	95	$1,480 00	$1,015 00
Fishing (angling) without a license	141	131	10		11	10	2,880 00	2,512 00
Wholesale dealing in fish without a license; not keeping a register of fish purchased	11	12	2		1		215 00	195 00
Illegal fishing apparatus (nets, lines, spears, etc.)	174	105	61	8	34	805	9,185 00	4,264 00
Salmon, catching or possession, close season; underweight for sale	7	7			4		370 00	70 00
Saturday and Sunday fishing with net for salmon, shad, or striped bass	8	8			1	180	885 00	35 00
Striped bass, close season; underweight; exporting	35	24	6	5	4	45	485 00	390 00
Black bass, close season; excess bag limit; undersized	9	5	4		2	250	120 00	20 00
Trout, close season, excess bag limit	100	93	5	2	7	10	1,929 00	1,559 00
Catfish, undersized, buying or selling	12	6	5	1	1	2	170 00	168 00
Sturgeon, undersized	4	4					80 00	80 00
Salt water perch, buying or selling	6	3	3				40 00	40 00
Taking fish within fifty feet of a fishway	1		1					
Using explosives to take fish	6	4	2			250	950 00	250 00
Polluting waters—oil, sawdust, etc.	6		4	2				
Failure to screen ditches when ordered	2	1	1				85 00	85 00
Young of fish, taking or possession	14	13	1		5		215 00	195 00
Taking shellfish in Monterey Fish Reservation	2	2			1		50 00	25 00
Crabs, close season; undersized; female	70	57	13		28	50	510 00	485 00
Clams, excess bag limit; undersized	35	35			4		400 00	340 00
Abalones, close season; undersized; other than for food purposes	61	55	3	3	7	20	1,105 00	875 00
Crawfish, close season; undersized and oversized	19	18	1			26	475 00	379 00
California dried shrimp and shells	16	14	2		7		140 00	140 00
Total fish cases	882	721	140	21	148	1,718	$21,049 00	$13,022 00
Total fish and game cases	2,087	1,747	296	44	280	3,108½	$44,150 50	$33,416 00

Recapitulation.

Arrests—			
Fish cases		882	
Game cases		1,205	
Total			2,087
Convictions—			
Fish cases	721		
Game cases	1,026		
		1,747	
Acquittals and dismissals—			
Fish cases	140		
Game cases	156		
		296	
Pending cases—			
Fish cases	21		
Game cases	23		
		44	
Total			2,087
Fines imposed—			
Fish cases		$21,049 00	
Game cases		23,101 50	
Total			$44,150 50
Fines collected—			
Fish cases		$13,022 00	
Game cases		20,394 00	
Total			$33,416 00
Number of days imprisonment—			
Fish cases		1,743	
Game cases		1,360½	
Total			3,103½

Total Arrests for a Period of Fourteen Years.

1902–1904	550
1904–1906	774
1906–1908	1,192
1908–1910	1,771
1910–1912	2,063
1912–1914	1,993
1914–1916	2,087
Total	10,430

Hunting and Angling License Sales.

	Angling January 1 to December 31		Hunting July 1 to June 30	
	1914	1915	1914-15	1915-16
Alameda	$2,895 00	$2,856 00	$8,183 00	$7,509 00
Alpine	198 00	158 00	60 00	56 00
Amador	520 00	690 00	1,647 00	1,569 00
Butte	2,219 00	2,026 00	2,828 00	2,462 00
Calaveras	748 00	906 00	1,559 00	1,450 00
Colusa	461 00	392 00	1,588 00	1,553 00
Contra Costa	616 00	524 00	2,257 00	2,117 00
Del Norte	72 00	187 00	323 00	506 00
Eldorado	1,051 00	1,218 00	1,488 00	1,431 00
Fresno	3,053 00	3,556 00	6,402 00	6,774 00
Glenn	294 00	287 00	1,017 00	1,016 00
Humboldt	3,232 00	3,086 00	3,907 00	3,517 00
Imperial	22 00	15 00	598 00	539 00
Inyo	1,576 00	1,553 00	1,154 00	1,189 00
Kern	1,270 00	1,262 00	5,251 00	5,068 00
Kings	450 00	715 00	1,335 00	1,549 00
Lake	342 00	344 00	1,316 00	1,155 00
Lassen	1,152 00	1,272 00	1,326 00	1,274 00
Los Angeles	10,318 00	11,259 00	22,212 00	19,489 00
Madera	496 00	501 00	1,019 00	*205 00
Marin	387 00	814 00	1,111 00	------------
Mariposa	111 00	73 00	269 00	264 00
Mendocino	2,098 00	1,803 00	3,451 00	*2,400 00
Merced	496 00	488 00	1,992 00	1,953 00
Modoc	476 00	574 00	943 00	1,038 00
Mono	413 00	402 00	225 00	221 00
Monterey	656 00	739 00	1,742 00	1,784 00
Napa	1,061 00	1,255 00	2,283 00	2,060 00
Nevada	1,442 00	1,526 00	1,694 00	1,535 00
Orange	1,007 00	970 00	2,879 00	2,692 00
Placer	1,571 00	1,568 00	2,055 00	2,435 00
Plumas	1,463 00	1,605 00	862 00	941 00
Riverside	665 00	944 00	3,223 00	3,158 00
Sacramento	2,616 00	2,199 00	5,546 00	3,075 00
San Benito	165 00	214 00	1,085 00	1,088 00
San Bernardino	2,166 00	3,196 00	3,820 00	3,177 00
San Diego	1,185 00	887 00	5,688 00	5,359 00
San Joaquin	1,758 00	1,927 00	4,240 00	3,969 00
San Luis Obispo	678 00	904 00	1,365 00	1,439 00
San Mateo	640 00	688 00	1,813 00	1,552 00
Santa Barbara	1,740 00	1,964 00	2,441 00	2,419 00
Santa Clara	2,460 00	3,339 00	4,747 00	4,807 00
Santa Cruz	2,052 00	2,004 00	2,541 00	1,690 00
Shasta	1,590 00	1,448 00	2,167 00	1,995 00
Sierra	523 00	478 00	331 00	306 00
Siskiyou	2,722 00	2,990 00	3,749 00	3,576 00
Solano	646 00	849 00	2,385 00	2,215 00
Sonoma	2,783 00	2,825 00	5,923 00	5,713 00
Stanislaus	1,140 00	1,273 00	1,807 00	2,195 00
Sutter	129 00	131 00	777 00	738 00
Tehama	581 00	589 00	1,397 00	1,335 00
Trinity	412 00	368 00	924 00	918 00
Tulare	2,650 00	2,468 00	3,878 00	3,862 00
Tuolumne	970 00	1,024 00	1,187 00	1,275 00
Ventura	1,373 00	1,547 00	1,972 00	2,184 00
Yolo	385 00	394 00	2,085 00	2,036 00
Yuba	418 00	437 00	1,283 00	1,128 00
San Francisco office	8,756 00	8,561 00	13,557 00	15,567 00
Los Angeles office	959 00	819 00	575 00	1,021 00
Sacramento office	291 00	537 00	580 00	2,443 00
Fresno office	596 00	547 00	742 00	911 00
Totals	$84,417 00	$89,620 00	$166,307 00	$158,930 00

*Account not closed.

FINANCIAL STATEMENT, FISCAL YEARS 1914-1915 and 1915-1916.

REVENUES AND DISBURSEMENTS.

Receipts for Fiscal Year 1914-1915.

June 30, 1914—Balance in state treasury		$9,885 70
Receipts.		
Sale of hunting licenses, 1913-1914	$6,056 00	
Sale of hunting licenses, 1914-1915	153,073 00	
		159,129 00
Sale of anglers' licenses, 1914	$71,521 00	
Sale of anglers' licenses, 1915	8,209 00	
		79,730 00
Sale of wholesale fish and game dealers' licenses, 1913-1914	$30 00	
Sale of wholesale fish and game dealers' licenses, 1914-1915	1,420 00	
		1,450 00
Sale of market fishing licenses, 1914-1915	$39,210 00	
Sale of market fishing licenses, 1915-1916	12,070 00	
		51,280 00
Sale of trout farm licenses		10 00
Sale of game farm products		415 03
Received from importers of crawfish for inspecting		992 97
Sundry sales, refunds, rebates, etc.		253 28
Fines paid into state treasury for violations of fish, game and license laws		15,937 50
Total		$319,083 48
Less exchange and express charges paid state treasurer on remittances made by county clerks and justices of the peace		60 92
Total		$319,022 56

Receipts for Fiscal Year 1915-1916.

Sale of hunting licenses, 1914-1915	$13,517 00	
Sale of hunting licenses, 1915-1916	150,346 00	
		$163,863 00
Sale of anglers' licenses, 1914	$108 00	
Sale of anglers' licenses, 1915	81,474 00	
Sale of anglers' licenses, 1916	16,682 00	
		98,264 00
Sale of wholesale fish and game dealers' licenses, 1914-1915	$90 00	
Sale of wholesale fish and game dealers' licenses, 1915-1916	1,535 00	
		1,625 00
Sale of market fishing licenses, 1915-1916	$26,240 00	
Sale of market fishing licenses, 1916-1917	9,820 00	
		36,060 00
Sale of trout farm licenses		20 00
Sale of game farm products		182 50
Received from importers of crawfish for inspecting same		1,100 00
Received from importers of abalone for inspecting same		1,010 00
Sundry sales, refunds, rebates, etc.		199 09
Fines paid into state treasury for violations of fish, game and license laws		18,187 00
Total		$320,510 59
Less exchange and express charges paid state treasurer on remittances made by county clerks and justices of the peace		48 20
Total		$320,462 39

Recapitulation.

Receipts for fiscal year, 1914-1915	$319,022 56	
Receipts for fiscal year, 1915-1916	320,462 39	
		$639,484 95
Disbursements, fiscal year 1914 1915	271,996 10	
Disbursements, fiscal year 1915 1916	320,808 19	
		592,804 29
July 1, 1916—Balance in state treasury		$46,680 66

Disbursements for Fiscal Year 1914-1915.

GENERAL ADMINISTRATION.

Commissioners' traveling and other expenses	$735 03	
Salaries of administrative assistants	12,081 50	
Traveling expenses of administrative assistants	832 24	
Rentals, office and other supplies	3,991 71	
		$17,640 48

GENERAL FISH AND GAME PATROL.

San Francisco Division.

Salaries of deputies and employees	$33,756 80	
Traveling expenses of deputies and employees	13,540 02	
Rentals, office and other supplies	2,200 11	
		49,496 93

Sacramento Division.

Salaries of deputies and employees	$29,355 31	
Traveling expenses of deputies and employees	14,196 77	
Rentals, office and other supplies	1,564 51	
		45,116 59

Los Angeles Division.

Salaries of deputies and employees	$12,870 67	
Traveling expenses of deputies and employees	3,954 94	
Rentals, office and other supplies	1,792 78	
		18,618 39

Fresno Division.

Salaries of deputies and employees	$12,843 84	
Traveling expenses of deputies and employees	6,439 12	
Rentals, office and other supplies	1,077 89	
		20,360 85

Miscellaneous Expenditures.

Prosecutions and allowances	4,398 12
General printing	2,058 13
Subtotal, general administration and patrol	$157,689 49
Cost general administration and game patrol (60 per cent)	$94,613 69
Cost general administration and fish patrol (40 per cent)	63,075 80
	$157,689 49

Fishery Expenditures.

Administration.

Salaries of superintendent of hatcheries and assistants	$3,967 82	
Traveling expenses of superintendent of hatcheries and assistants	1,542 99	
Office and other supplies	620 64	
		6,131 45

Fishery Research and Publicity.

Salaries	$3,610 30	
Traveling expenses	1,285 22	
Supplies and general expenses	1,366 95	
		6,262 47

Screen and Fishway Surveys.

Salaries	$2,620 34	
Traveling expenses	1,422 70	
Supplies and general expenses	26 51	
		4,069 55

Fish Transplanting (Pack Train, Messengers, etc.).

Salaries	$1,361 08	
Traveling expenses	2,717 22	
Supplies and general expenses	159 69	
		4,237 99

Fish Distribution Cars.

Salaries	$2,001 89	
Traveling expenses and mess allowance	1,158 40	
General expenses and supplies	1,118 67	
Repairs	959 21	
		5,238 17

Fish Patrol (Launches, etc.),

Salaries	$2,717 84	
Traveling expenses and mess allowance	713 31	
Repairs	552 43	
Supplies (oil, etc.) and general expenses	1,032 89	
		5,016 47

Sisson Hatchery.

Salaries	$17,996 18	
Traveling expenses	27 35	
Construction and repairs	2,788 74	
Fish food and ice for meat	4,628 97	
General expenses and supplies	1,084 07	
		26,525 31

Sisson Hatchery Auxiliary Stations.

Salaries	$2,177 37	
Traveling expenses	262 33	
Construction and repairs	425 68	
General expenses and supplies	186 88	
		3,052 26

Tahoe Hatcheries.

Salaries	$1,933 67	
Traveling expenses	167 70	
Construction and repairs	34 36	
General expenses and supplies	370 83	
		2,506 56

Price Creek Hatchery.

Salaries	$1,764 17	
Traveling expenses	154 55	
Construction and repairs	58 54	
General expenses and supplies	890 78	
		2,868 04

Ukiah and Snow Mountain Hatchery.

Salaries	$2,259 87	
Traveling expenses	167 89	
Construction and repairs	581 99	
General expenses and supplies	426 20	
		3,435 95

Wawona Hatchery.

Salaries	$120 00	
Traveling expenses	50 35	
Construction and repairs	---------	
General expenses and supplies	---------	
		170 35

Scott Creek and Brookdale Hatchery.

Salaries	$1,139 50	
Traveling expenses	7 50	
Construction and repairs	14 88	
General expenses and supplies	415 95	
		1,577 83

Bear Valley Hatchery.

Salaries	$602 66	
Traveling expenses	199 60	
Construction and repairs	---------	
General expenses and supplies	29 56	
		831 82

Miscellaneous Expenditures.

Printing and lithographing fishing licenses	630 26
Anglers' license commissions and refunds	8,573 65
Market fishing license commissions	692 25
Crawfish and abalone inspection	904 03
Subtotal, fishery expenditures	$82,724 41

Game Expenditures.

Hayward Game Farm.

Salaries	$2,566 00	
Traveling expenses	141 15	
Rent	450 00	
Construction and repairs	378 31	
Feed for birds	655 64	
General expenses and supplies	775 43	
		$4,966 53

Game Research and Publicity.

Salaries	$3,636 08	
Traveling expenses	678 22	
General expenses and supplies	3,026 37	
		7,340 67

Miscellaneous Expenditures.

Printing and lithographing of hunting licenses	$567 50
Hunting license commissions and refunds	15,287 50
Mountain lion bounties	3,420 00
Subtotal, game expenditures	$31,582 20
Grand total of all expenditures	$271,996 10

Segregation.

Total of fish expenditures	$145,800 21
Total of game expenditures	126,195 89
Total	$271,996 10

Disbursements for Fiscal Year 1915-1916.

GENERAL ADMINISTRATION.

Commissioners' traveling and other expenses	$740 91	
Salaries of administrative assistants	14,872 17	
Traveling expenses of administrative assistants	1,582 56	
Rentals, office and other supplies	4,847 05	
		$22,042 69

GENERAL FISH AND GAME PATROL.

San Francisco Division.

Salaries of deputies and employees	$39,653 85	
Traveling expenses of deputies and employees	18,399 03	
Rentals, office and other supplies	2,888 54	
		60,941 42

Sacramento Division.

Salaries of deputies and employees	$29,481 00	
Traveling expenses of deputies and employees	14,185 99	
Rentals, office and other supplies	1,757 47	
		45,424 46

Los Angeles Division.

Salaries of deputies and employees	$15,201 16	
Traveling expenses of deputies and employees	5,059 90	
Rentals, office and other supplies	2,079 29	
		22,340 35

Fresno Division.

Salaries of deputies and employees	$9,699 54	
Traveling expenses of deputies and employees	5,353 10	
Rentals, office and other supplies	794 74	
		$15,847 38

Miscellaneous Expenditures.

Prosecutions and allowances	2,995 03
General printing	6,488 03
Accident claims	3,632 25
Subtotal, general administration and patrol	$179,711 61
Cost general administration and game patrol (65 per cent)	$116,812 55
Cost general administration and fish patrol (35 per cent)	62,899 06
	$179,711 61

Special Fishery Expenditures.

Administration.

Salaries of superintendent of hatcheries and assistants	$4,890 67	
Traveling expenses of superintendent of hatcheries and assistants	1,681 99	
Office and other supplies	1,135 77	
		$7,708 43

Fishery Research and Publicity.

Salaries	$3,991 66	
Traveling expenses	662 05	
General expenses and supplies	1,053 31	
		5,707 02

Screen and Fishway Surveys.

Salaries	$2,799 00	
Traveling expenses	1,949 56	
General expenses and supplies	112 70	
		4,861 26

Fish Transplanting.

Salaries	$485 00	
Traveling expenses	866 95	
General expenses and supplies	45 81	
		1,397 76

Fish Distribution Cars.

Salaries	$2,473 92	
Traveling expenses and mess allowance	1,537 72	
Repairs	2,064 88	
General expenses and supplies	2,688 31	
		8,764 83

Special Fish Patrol (Launches, etc.).

Salaries	$4,247 02	
Traveling expenses and mess allowance	1,181 02	
Repairs	579 48	
Supplies (oil, etc.) and general expenses	1,868 16	
		7,875 68

Sisson Hatchery.

Salaries	$18,083 70	
Traveling expenses	132 70	
Construction and repairs	932 49	
Fish food and ice for meat	5,098 16	
General expenses and supplies	1,853 22	
		26,100 27

Sisson Hatchery Auxiliary Stations.

Salaries	$1,322 23	
Traveling expenses	55 00	
Construction and repairs	155 76	
General expenses and supplies	247 74	
		1,780 73

Tahoe Hatcheries.

Salaries	$2,369 67	
Traveling expenses	199 08	
Construction and repairs	67 72	
General expenses and supplies	589 18	
		3,225 65

Price Creek Hatchery.

Salaries	$43 10	
Traveling expenses	----------	
Construction and repairs	----------	
General expenses and supplies	1 45	
		44 55

Ukiah and Snow Mountain Hatchery.

Salaries	$2,426 50	
Traveling expenses	200 27	
Construction and repairs	101 20	
General expenses and supplies	757 53	
		3,485 50

Scott Creek and Brookdale Hatcheries.

Salaries	$1,782 80	
Traveling expenses	30 85	
Construction and repairs	6 70	
General expenses and supplies	590 15	
		$2,410 50

Inyo County Hatchery.

Construction	$12,993 94	
Equipment	6,916 39	
		19,910 33

Bear Valley Hatchery.

Salaries	$1,143 65	
Traveling expenses	299 40	
Construction and repairs	53 64	
General expenses and supplies	364 55	
		1,861 24

Marlett Lake and Carson Hatchery.

Salaries	$528 22	
Traveling expenses	---------	
Construction and repairs	2 50	
General expenses and supplies	272 37	
		803 09

Fort Seward Hatchery.

Salaries	$480 00	
Traveling expenses	9 30	
Construction	3,374 69	
General expenses and supplies	97 52	
		3,961 51

Almanor Station.

Salaries	$572 02	
Traveling expenses	53 50	
Construction and repairs	66 69	
General expenses and supplies	115 48	
		807 69

Miscellaneous Expenditures.

Printing and lithographing fishing licenses	562 22
Anglers' license commissions and refunds	9,299 40
Market fishing license commissions	778 00
Crawfish and abalone inspection	2,100 00
Subtotal, fishery expenditures	$113,445 66

Special Game Expenditures.

Hayward Game Farm.

Salaries	$2,254 50	
Traveling expenses	336 96	
Rent	412 50	
Construction and repairs	51 62	
Feed for birds	518 92	
General expenses and supplies	686 18	
		$4,260 68

Game Research and Publicity.

Salaries	$2,679 25	
Traveling expenses	221 85	
General expenses and supplies	735 08	
		3,636 18

Miscellaneous Expenditures.

Printing and lithographing of hunting licenses	805 60
Hunting license commissions and refunds	14,844 70
Mountain lion bounties	3,800 00
Winter game feeding	303 76
Subtotal, game expenditures	$27,650 92
Grand total of all expenditures	$320,808 19

Segregation.

Total of fish expenditures	$176,344 72
Total of game expenditures	144,463 47
Total	$320,808 19

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